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Examining the Relationship between Toddler Self-Regulation and Maternal Self-Efficacy

A Thesis

Presented for the

Master of Science

Degree

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Yu-Chuen Huang

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ABSTRACT

The present study examined the relationship between maternal self-efficacy and child self-regulation during the toddler years. Using a local database, the current study focused on specific dimensions of maternal self-efficacy in an effort to move beyond global descriptions of the construct. The results showed that maternal self-efficacy was negatively associated with child dysregulation ratings. In addition, the instrumental care dimension of maternal self-efficacy was the most influential predictor of child dysregulation ratings. Moreover, negative emotionality and sensory sensitivity have stronger associations with maternal self-efficacy than the other aspects of child dysregulation. However, this study found no gender or socioeconomic differences on maternal self-efficacy and child self-regulation.

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CHAPTER 1: INTRODUCTION

Self-regulation is critical to whether an individual can effectively cope with the stress caused by his or her surroundings and manage his or her emotions well (Buckner, Mezzacappa, & Beardslee, 2003). The ability to exercise a sufficient level of self-regulation is an important developmental task in an individual's life span, especially in early childhood (Colman, Hardy, Albert, Raffaelli, & Crockett, 2006). Young toddlers have difficulty self-soothing their arousals and need external agents to help them learn how to respond to demands (Garner, 1995; Putnam, Spritz, & Stifter, 2002). They interact with caregivers to gain comfort or regulate emotional stress (Diener & Mangelsdorf, 1999). In addition, it has been shown that toddlers are better able to self-regulate if their mothers are available (Kopp, 1989). Therefore, mothers play an important role by assisting their children to regulate their emotional arousals during the toddler period (Kopp, 1989). Even though the influence of mothers' behavior is crucial to toddlers' self-regulation development (Calkins & Johnson, 1998), little empirical research focuses on the influence of mothers on the development of toddlers' self-regulation (Raffaelli, Crockett, & Shen, 2005). Research concerning the developmental trajectory of self-regulation typically focuses on middle childhood developmental outcomes (Colman et al., 2006; Raffaelli et al., 2005).

Some studies have demonstrated that maternal self-efficacy influences child self-regulation. Research has documented that maternal self-efficacy was negatively associated with preschool-aged children's conduct problems (Jackson & Scheines, 2005) and positively associated with preschool-aged children's self-regulation (Brody, Flor & Gibson, 1999). However, the influence of maternal self-efficacy on toddlers' self-

regulation capacity must be further investigated (Coleman & Karraker, 1997, 2003). Moreover, when examining the influence of maternal self-efficacy, it is critical to examine the influence of demographic characteristics on children and their families. Previous research (Maniadaki, Sonuga-Barke, Kakouros, & Karaba, 2005; Surkan, Kawachi, Ryan, Berkman, Carvalho Vieira, & Peterson, 2008) has suggested that child gender influences maternal self-efficacy during mother-child interaction. In addition to child gender, socioeconomic status, especially financial hardship, is an important factor influencing mothers' self-efficacy. Past research has indicated that economic pressure is negatively associated with mothers' self-efficacy (Elder, Eccles, Ardelt, & Lord, 1995) and that mothers' financial resource adequacy is positively associated with maternal self-efficacy (Brody, Flor, & Gibson, 1999).

The present study will focus on the relationship between maternal self-efficacy and toddlers' self-regulation. Few empirical studies have examined the relationship between maternal self-efficacy and toddlers' self-regulation and the potential impact of child and family characteristics. Therefore, the present study will examine the influence of toddlers' gender and family socioeconomic status on maternal self-efficacy and toddlers' self-regulation. Furthermore, this study will further investigate the relationships among specific dimensions of maternal self-efficacy and the aspects of toddlers' self-regulation.

CHAPTER 2: REVIEW OF LITERATURE

Theoretical Framework

The *bioecological systems model* serves as the theoretical framework for this study. Brofenbrenner and Morris (1998) expanded the *bioecological systems model* from Bronfenbrenner's (1979) *ecological systems theory* (Brofenbrenner & Morris, 1998; Gallagher, 2002). According to Bronfenbrenner's *ecological systems theory* (1979), there are four systems that influence child development. The first is the *microsystem*, in which children interact with the settings they immediately live in (e.g. children's family and the child care centers or schools where they spend time). The second is the *mesosystem*, which is the system of interactions among several *microsystems* (e.g. the interaction between children's family and child care centers, for example). The third is the *exosystem*, which indirectly affects children through the influence of public policies or social service on *microsystems* (e.g. the support or services provided by the community where children live). The fourth is the *macrosystem*, which represents the cultural system in which children live (Bronfenbrenner, 1979; Schweiger & O'Brien, 2005; Wehman, 1998).

Expanding on the *ecological systems theory*, the *bioecological systems model* considers the influence of parenting combined together with a child's characteristics (e.g. temperament) on child development (Brofenbrenner & Morris, 1998; Gallagher, 2002). Gallagher (2002) argued that the influence of parenting on child outcomes, such as future adjustment, is a function of child characteristics, such as temperament. In other words, there exists an interaction between child characteristics and environment. For example, children's temperamentally different responses elicit different parenting, which means

that parenting patterns are shaped by children's temperamental reactivity (Gallagher, 2002; Meléndez, 2005; Putnam, Spritz, & Stifter, 2002). Gallager (2002) noted that "qualities of parenting may predict different outcomes for children with different temperament characteristics" (p. 627).

Some studies have examined the bioecological systems model. For instance, Park, Belsky, Putnam, and Crnic (1997) conducted a study to examine the relationship between child emotionality and later inhibition and the relationship between parenting and child inhibition. The participants were 125 Caucasian parents and their firstborn sons. Child temperament data was collected when the infants were 10 months old. When children were 36 months, their inhibition responses were assessed in a lab context. The results showed that inhibition of children with high negative emotionality is more affected by negative parenting, such as intrusiveness and negative affection, than for children with low negativity. A study by Early et al. (2002) obtained a similar result. They examined whether an interaction existed between child early wariness and maternal sensitivity on child later wariness. Two hundred and fifteen parents and their children were involved in this longitudinal study. They found that high maternal sensitivity lowered the inhibition of children who showed wariness at 15 months more than those who did not show wariness at 15 months. On the contrary, low maternal sensitivity led to children with wariness at 15 months to show higher inhibition than those who did not show wariness at 15 months. Thus, this study suggested that there is an interaction between maternal sensitivity and children's early temperament.

In conclusion, the above three studies suggested that the parenting process, which has an interaction with children's temperament, has an influence on children's socio-emotional development (Gallagher, 2002).

The Development of Child Self-Regulation

Child self-regulation is important to future developmental outcomes (Kopp, 1982, 1989). However, research regarding the developmental trajectory of self-regulation usually focuses on middle childhood development, with little research focusing on early childhood development (e.g., Golden, Montare, & Bridger, 1977; Houck & LeCuyer-Maus, 2004; Scaramella & Leve, 2004). Therefore, the developmental trajectory of self-regulation in early childhood should also be investigated.

The Definition and Structure of Self-Regulation

Self-regulation is an important developmental task. Child self-regulation skills have been found to be a predictor of later resilience and to be critical in coping and adaptation (Buckner, Mezzacappa, & Beardslee, 2003). If children cannot regulate their emotions well, they may experience mental and conduct disorders (Gross, 1998). Buckner, Mezzacappa, and Beardslee (2003) observed that self-regulation skills are important to effectively cope with stress. Children who have effective regulatory skills can adapt to ongoing stressors and successfully employ strategies to manage them.

Self-regulation can be defined as the individual's capacity to use internal self-guidance to regulate emotion and behavior so that he or she can effectively respond to internal and external demands and social rules (Barrett, 2005; Raffaelli, Crockett, & Shen, 2005). Self-regulation can also be viewed as a process or transaction in which an individual modulates his or her emotion and behavior, and directs activities toward

specific goals (Buckner, Mezzacappa, & Beardslee, 2003). Kopp (1982) conceptualized self-regulation as the ability of an individual to fulfill social demands, manage arousals and modify behavior according to different social situations, and delay gratification without external control and monitoring (Kopp, 1982; Houck & LeCuyer-Maus, 2004). Therefore, self-regulation can be viewed as "a balance between compliance and self-assertion" (Houck & LeCuyer-Maus, 2004, p. 30).

In Karreman, van Tuijl, van Aken, and Deković's meta-analysis (2006), they listed four categories of self-regulation. One category is *compliance*. Compliance is viewed as early self-regulation, which reflects a child's ability to modulate behavior to respond to the demands from his or her parents. Another category is *inhibition,* which reflects one's self-control as the ability to delay behavior when there is no external monitoring. Delay of gratification is an example of this category. *Emotion regulation* is a process whereby an individual manages his or her arousals and behaves or expresses emotions appropriately. The operational definition of emotion regulation is an individual's strategies to manage arousals to respond to emotionally reactive situations. The fourth category listed in the study is *effortful control*, described as "a type of mature self-regulation, which includes the ability to suppress a dominant response" (Karreman et al., 2006, p. 563). The similarity of these four categories is that they reflect the modulation of one's behavior and emotions, but the differences in them are the degree to which one internalizes the requests, and which domains of behavior or emotions one modulates.

Another view regarding self-regulation structure was illustrated in the research of Raffaelli, Crockett, and Shen (2005). They demonstrated three theoretical models that described the structure of an individual's self-regulation. One model is that each

component of self-regulation functions separately. Another is to treat emotionality and self-regulation as two different domains. Emotionality is related to one's native-born temperament. The research found that emotionality and self-regulation were related, which indicates that early temperament or emotionality has an influence on later self-regulation. The third model is that multiple dimensions of self-regulation are interrelated, and these dimensions work together to respond to external stimuli in one's daily life. According to this model, a child's emotion regulation, behavior regulation and attention regulation should be integrated and work together so that a child can fulfill internal and external requests to do or not to do some actions (Raffaelli et al., 2005).

The Developmental Trajectory of Self-Regulation

In the first ten years of the life span, an individual experiences an important transformation in his or her self-regulation development, progressing from an infant who needs external assistance to regulate his arousals, to a middle-childhood-aged child who can monitor and modify his or her own behavior and expression of emotion.

Kopp (1982) presented a model of developmental phases of child self-regulation and used the term *phase* to emphasize that the development of child self-regulation is gradual, instead of immediate. When children are 12 to 18 months old, they become able to control their own behavior, be aware of external requests, and fulfill demands from parents. With the guidance of their parents, children gradually internalize the prevailing social norms and expectations. At 24 months, children's self-control capacity has become mature, which means they can delay or regulate their behavior without external assistance, especially without assistance from their parents. When children grow to 36 months, their regulatory ability becomes more mature and improves more than 24 months

so that they are able to modify their behavior by themselves in order to fulfill external demands (Karreman et al., 2006; Kopp, 1982). The primary view of this model was that child self-regulation gradually shifts from external to internal (Karreman et al., 2006).

Therefore, according to this self-regulation model, children face regulatory tasks at different age stages. In infancy, infants experience physiological regulatory tasks, such as the control of wakefulness, and learn how to modulate their arousals and actions (Kopp, 1982; Raffaelli et al., 2005). During the toddler period, young children are aware of external demands and begin to learn how to control their own behavior (Kopp, 1982; Raffaelli et al., 2005). During the preschool period, children start to learn how to delay their gratification (Raffaelli et al., 2005). By the age when they enter kindergarten, children's self-regulatory capacities have become more mature (Raffaelli et al., 2005). However, self-regulatory ability continues to grow because some cognitive capacities that assist a child to self-regulate as an adult, such as "goal setting," continue to grow until later childhood (Raffaelli et al., 2005, p. 56).

Factors Related to Child Self-Regulation Development

According to Kopp's model (1982), child self-regulatory capability changes with age. However, Murphy, Eisenberg, Fabes, Shepard, and Guthrie's longitudinal study (1999) found that only some components of self-regulation change as children age. When children are 4 to 6 years old, their shifting of attention, inhibition control, and impulse control change, but attention focusing and behavioral regulation do not change compared to their regulation performance at younger ages.

Another study that examined the developmental trajectory of child self-regulation is that of Raffaelli, Crockett, and Shen (2005), which examined the structure of self-

regulation, the stability of self-regulation over time, and whether this stability has individual differences. Using the National Longitudinal Survey of Youth (NLSY), the researchers "identified a cohort of children aged 4 to 5 years in 1986" (Raffaelli et al., 2005, p. 60). The data used in their study consisted of three waves: Time 1 when children were 4 to 5 years of age, Time 2 when children were 8 to 9 years old, and Time 3 when children were 11 to 12 years old. There were 646 children included in their study because these children attended all three waves and their self-regulation data were available. The researchers found that children's early emotionality was related to children's self-regulation at all three time points, and the three factors of self-regulation—attention, affect, and behavior—were highly intercorrelated with each other through three time points. The structure of self-regulation was not significantly different between boys and girls at the three time points. In addition, self-regulation at each time point was correlated to the others. This result reflects the stability of an individual's self-regulation structure over time. Moreover, in examining the age-related change of self-regulatory capacity, it was found that there was a significant increase of self-regulatory capacity from Time 1 to Time 2, but after Time 2, there was no significant increase of self-regulation from Time 2 to Time 3. This result suggests that self-regulatory capacity grows as age increases, but becomes stable and does not increase much after 8 years old. The study also noted that girls had higher levels of self-regulation than boys.

Age is an important factor in the growth of self-regulation. Kalpidou, Power, Cherry, and Gottfried (2004) conducted a study to examine the relationship between a child's age and emotion and behavior regulation. They recruited 43 children aged 3 years old and 44 children aged 5 years old to participate in their study. Emotion and behavior

regulation were observed in a lab task and were rated according to a child's expression of emotions and physical movement. Mothers and teachers rated the coping strategies children used in some hypothetical situations. Five-year-old children were found to be more comfortable during tasks than three-year-old children. In addition, three-year-old children had more difficulty waiting for toys than five-year-old children. Findings from Kalpidou et al. (2004) demonstrated that older children expressed better emotion regulation than younger children. Moreover, Kochanska, Coy, and Murray (2001) conducted a longitudinal study to understand the development of child self-regulation in the first four years. In this study, the researchers measured child compliance as an indicator of early self-regulation development. In order for a child to behave in compliance with caregivers' demands, the child must have the capacity to modulate his behavior to fulfill the external requests; this is the capacity of self-regulation (Kochanska et al., 2001; see also Kopp, 1982). Child compliance in a structured lab setting was examined when participant children were 14, 22, 33, and 45 months old. During these lab sessions, mothers were asked to demand that the children clean toys, or to prohibit children to touch toys. The researchers recoded whether compliance occurred or not per segment in each context, and then calculated the relative scores of compliance that occurred in each context for each age group. The results showed that there were significant compliance differences as age increased. For committed compliance, there was a significant increase of compliance between 14 and 22 months and between 22 and 33 months. In addition, in the case of situational compliance there was a significant increase of compliance between 14 and 22 months. Thus, children of different ages displayed different levels of self-regulation.

Cognition is another important factor related to the development of child self-regulation. Kopp (1989) argued that child self-regulation is related to the development of cognitive processes, such as "means-ends awareness" and "representation" (Kopp, 1989, p. 345). According to Kopp (1989), young children regulate their emotional arousals depending on their inner emotional regulators, but these regulators do not immediately emerge. The development of inner emotional regulators needs the assistance of mature cognitive processes, such as distinguishing caregivers' facial expressions, a mature memory system and attention ability, and knowledge about sources of arousal (Diener & Mangelsdorf, 1999; Kopp, 1989). Therefore, the development of cognition is central to young children's self-regulation development (Kopp, 1982; Silverman & Ragusa, 1990).

In conclusion, previous studies found that young children's self-regulatory capacity grows as age increases. Moreover, young children's cognitive processes became mature as they grow up, so as to assist the development of self-regulatory capacity. Thus, age and cognition are two important factors related to whether young children can develop regulatory strategies to express their emotions appropriately.

Maternal Self-Efficacy and Its Association with Child Self-Regulation

Previous research (Calkins & Johnson, 1998; Lecuyer & Houck, 2006) has indicated the importance of mothers' effective parenting to the development of toddlers' self-regulation. Mothers' ability to perform effective parenting practices or strategies to regulate their children's emotional reactivity is influenced by several factors, one of which is self-efficacy beliefs of parenting (Bandura, 1977, 1989; Coleman & Karraker, 1997; Coleman, 1998; Kopp, 1989). The main purpose of this study is to examine the relationship between parenting self-efficacy and toddlers' self-regulation development.

However, the majority of responses to participating in this study were from mothers during participant recruitment. Thus, this study only considers self-report data from mothers, and will focus on maternal self-efficacy. Paternal self-efficacy is excluded from this study.

The Concept and Development of Maternal Self-Efficacy

Self-efficacy is defined as a person's belief that he or she is able to perform a specific behavior or achieve a particular task or event (Bandura, 1977). Parental self-efficacy as a construct relates to parents' perceptions of their ability to perform the parental role successfully (Teti & Gelfand, 1991). Parental self-efficacy can also be referred to as parents' perceptions that they have an ability to have a positive influence on their children's behavior (Coleman & Karraker, 1997; Coleman, 1998). The components of parental self-efficacy, as Bandura (1989) noted, are the level of parents' knowledge about child caregiving and the degree of parental confidence that they can perform the role of parent well. In this view, a mother needs to have knowledge of child caring or child development and possess maternal confidence so as to perform parenting successfully (Bandura, 1977, 1989; Conrad, Gross, Fogg, & Ruchala, 1992).

These two components of parental self-efficacy are important to understand the influence of maternal self-efficacy on parent-child interaction. Conrad, Gross, Fogg, and Ruchala (1992) conducted a study to understand the interaction effect of mothers' knowledge of child rearing and development and maternal confidence on the quality of mother-child interactions. Fifty mothers and their toddlers aged 12 to 35 months were recruited in this study. The majority of these participants were middle-class and well-educated European American mothers. The researchers categorized mothers based on

their child knowledge scores above or below one standard deviation of the mean score, and the degree of their confidence—less or more maternal confidence. A two-way (2×3) ANOVA was conducted to examine the main effect and interaction of child knowledge and maternal confidence on the quality of mother-child interaction. The study found that neither the mothers' child knowledge nor maternal confidence showed main effects on the quality of mother-child interaction. However, there was an interaction between these two factors. The post hoc comparisons showed that for less confident mothers, the level of their child development knowledge did not make any difference on mother-child interaction. However, for more confident mothers, the more knowledge about child development they had, the better they interacted with their children. These findings indicated that maternal confidence influenced mother's interaction with their children together with the influence from mothers' child-rearing knowledge. In other words, the effect of these two factors should not be separately interpreted.

Coleman and Karraker (1997) completed a literature review to synthesize research findings about maternal self-efficacy and its influence on mothers' parenting and child developmental outcomes. They summarized the previous studies to list four sources of maternal self-efficacy development. The first source was derived from attachment theory, which suggests that parents' "internal representation" influences their real experience on parenting behavior (Coleman & Karraker, 1997, p. 63). The attachment theorists posit that a person's relationship schemas are constructed through his or her developmental path and then these schemas influence how he or she behaves and interprets the external surroundings (Coleman & Karraker, 1997). Deutsche, Ruble, Fleming, Brooks-Gunn, and Stangor (1988) initiated a study to understand the developmental process of mothers'

self-definition. They collected information about mothering and maternal attitudes that mothers perceived they possessed. The researchers recruited 670 pregnant women and randomly divided them into two groups: during pregnancy or postpartum. It was found that pregnant participants' self-confidence as mothers and their perceived mothering were positively associated with their childhood relationship with their mothers and received information about pregnancy. These findings indicate that pregnant mothers' attachment to their mothers influences their later self-efficacy as mothers themselves (Deutsche et al., 1988).

The second resource is derived from real child care experience or interaction between parents' own children and other people's children. The work of Deutsche et al. (1988) supported this viewpoint. They collected data about mothers' previous experience with babies. Their data on mothering and attitudes of motherhood gathered at 1 or 3 months postpartum showed that maternal confidence and perceived parenting practices were positively associated with their previous experience of rearing their children, or experience of interacting with their newborn children, and their self-esteem. It was argued that parents' interaction with children can be viewed as a feedback which influences parents' perceptions of their ability whether they can act the role as parents well or perform parenting effectively (Goodnow, 1985, cited in Coleman & Karraker, 1997).

Moreover, Bandura's study (1977) concluded that task difficulty influences a person's self-efficacy. Children can be classified as easy or difficult based on their temperament (Leerkes & Crockenberg, 2002). Easy children are soothed without difficulty, express their arousals effectively, or whose parents can easily predict their

emotional reactions. On the contrary, difficult children's emotional reactions are "irregular and difficult to predict" (Cutrona & Troutman, 1986, p. 1507). If mothers rear easy children, they may feel that their parenting performance is effective, which results from children's positive emotional responses (Leerkes & Crockenberg, 2002). However, if parents have children with difficult temperaments, they will feel distressed about how to respond to their children's emotional reactivity (Leerkes & Crockenberg, 2002). Deutsche et al. (1988) supported these viewpoints. Their study collected mothers' self-reported child difficult temperament. They found that maternal self-reported child difficult temperament was negatively associated with postpartum self-confidence as mothers and their perceived mothering. Thus, children' difficult temperament can be viewed as a child rearing task difficulty for mothers and leads to lower perceived maternal self-efficacy.

The third resource, according to Coleman and Karraker (1997), is the degree to which parents prepare cognitively and psychologically for their role as parents. This degree of preparation is related to the knowledge about parenthood parents received (Coleman & Karraker, 1997; Conrad et al., 1992; Deutsche et al., 1988).

The work of Deutsche et al. (1988) examined the relationship between the information mothers received during pregnancy and their self-definition. The data gathered regarding maternal received knowledge included motherhood transition and preparation for their newborn babies. This study found that knowledge received about motherhood during pregnancy was positively associated with pregnant participants' self-confidence as mothers and their perceived mothering. In addition, Conrad et al. (1992) examined the relationship among mothers' knowledge about child development, maternal

self-confidence, and their interaction with toddlers. They found that mother's child development and child-rearing knowledge moderated the effect of maternal self-confidence on the quality of interaction with children. Thus, the above research findings indicated that the more knowledge about motherhood and child development mothers received, the higher their level of parental self-efficacy. In other words, mothers' knowledge of child development and caregiving was associated with their perception of performing their parental role well.

In addition, Deutsche et al. (1988) found that child difficult temperament was negatively associated with postpartum self-confidence as mothers. However, they did not further examine whether there was an interaction between child difficult temperament and maternal received knowledge about motherhood and child development on postpartum self-confidence as mothers. In other words, it remains unknown in their study that whether mothers' received knowledge about motherhood and child development can buffers the negative influence of child difficulty on maternal self-efficacy.

The fourth resource comes from parents' residing cultural context and communities. This influence results from the information about the values of parenthood that parents can receive from their living communities (Coleman & Karraker, 1997). However, parents may judge and select the messages received from their parents, friends, and communities based on their cognitive belief systems, and then the selected information gradually forms their parenting self-efficacy (Grusec et al., 1994). Therefore, the development of parental self-efficacy should be treated as a product gradually shaped by parents' residing cultural context and communities, instead of a straight product shaped by these social and cultural contexts (Coleman & Karraker, 1997; Grusec et al., 1994).

The Association of Maternal Self-Efficacy with Parenting

Maternal self-efficacy can be defined as a mother's beliefs or expectations of her ability to perform competent parenting practices (Coleman & Karraker, 1997; Teti & Gelfand, 1991). Teti and Gelfand's study (1991) examined the influence of maternal self-efficacy on mothers' behavioral competence. Eighty-six mothers and their infants aged 3 to 13 months were recruited in their study. Data of infant temperament, maternal depression, and mothers' self-efficacy was collected during home visits. Mothers' behavioral competence was observed mother-child interactions, and mothers' behavior was coded during their interactions with infants in a free-play context. The results showed that maternal self-efficacy was positively associated with more use of positive mothering, such as warm mothering and higher maternal sensitivity. This study demonstrated the positive influence of maternal self-efficacy on maternal use of positive parenting practices.

In addition, Donovan, Leavitt, and Walsh (1990) conducted an experiment to examine whether mothers' inefficacy influenced or limited their abilities to learn to effectively respond to children's emotional reactivity during child care tasks. In this study, high *illusory control* was an indicator of an individual's inefficacy (or lower levels of one's self-efficacy) as "illusory control" was conceptualized as overestimating control which masks inefficacy (Donovan et al., 1990).

Sixty-six mothers with their 5-month-old infants participated in this study. Two simulated child-care tasks demonstrated that an illusory control paradigm assessed mothers' inefficacy, and a learned helplessness paradigm assessed their learned helplessness responses. If a mother was low in self-efficacy, she would be classified into

the high illusory control group by the results assessed via the illusory control paradigm. Moreover, if a mother was rated low in self-efficacy, she would have difficulty acquiring new skills to effectively respond to her child's emotional reactivity, and she would display learned helplessness responses as well during child-care tasks. The researchers proposed if a mother is low in self-efficacy, her low or limited ability to acquire how to respond to infant cries would cause her to express sensitive responses to infant crying or display helpless responses during child care tasks (Donovan et al., 1990).

The results showed that mothers in high illusory control group showed a more depression-prone style of attributions to simulated infant crying than middle and low illusory control groups in child-care tasks. In other words, these mothers were inclined to attribute positive outcomes to unstable factors, which indicated their higher sense of inefficacy than that perceived by members of the other two groups. Moreover, mothers in high illusory control group displayed a higher degree of learned helplessness when experiencing inescapable infant crying than the other two groups in an induced learned helplessness trial. This study indicated that mothers with lower self-efficacy reacted with less effective responses to their children's emotional reactivity. In addition, their study also supported Bandura's perspective (1982) that an individual's low self-efficacy would inhibit his ability to acquire new skills and to perform their originally owned skills to achieve a task.

The Association of Maternal Self-Efficacy with Child Self-Regulation

Many studies have examined the influence of maternal self-efficacy on child developmental outcomes or problems, such as behavior or self-regulation problems. Jackson and Scheines (2005) conducted a three-year longitudinal study to understand the

developmental path of family financial strain, maternal mental health, and maternal self-efficacy on mothers' parenting and child developmental outcomes. The researchers recruited 188 current and former single mothers and their preschool-aged children to participate in this study. Ninety-five mothers were unemployed at the time of the study. The study consisted of two sessions that at time 1, mothers completed questionnaires and received home interviews, and then at time 2, children's teachers completed questionnaires about child developmental outcomes. Children's behavior problems were assessed through mothers' ratings of the degree of conduct problems.

The results of path analysis showed a direct effect of maternal self-efficacy on mothers' parenting practices. Maternal self-efficacy was positively associated with the quality of maternal parenting. Maternal self-efficacy was also found to influence children's behavior problems, but this influence was an indirect effect of mothering. Maternal self-efficacy was negatively associated with the degree of child behavior problems, but quality of mothering mediated this relationship.

Coleman and Karraker (2003) conducted a study to examine the psychometric properties of a parenting self-efficacy measure: The Self-Efficacy for Parenting Task Index-Toddler Scale (SEPTI-TS). The authors recruited 68 mothers with their 19- to 25-month-old toddlers. The majority of these participants were well-educated, middle-class European mothers. Child developmental outcomes were assessed by the Mental Scale of the Bayley Scales. This scale was used to measure participating toddlers' current developmental status, including memory, language and social skills, and negativity of emotional reactivity. The results showed that, in general, higher scores of maternal self-efficacy were associated with higher rated scores of child developmental outcomes.

Specifically, higher maternal self-efficacy was positively associated with child compliance, negatively associated with avoidance of mothers, and negatively associated with child negativity. In other words, the findings of this study suggested that higher maternal self-efficacy has a positive influence on reducing children's negative emotional reactivity when responding to mothers.

In addition, Brody, Flor and Gibson (1999) conducted a study to examine the links among family financial strain, maternal self-efficacy, maternal competence of parenting practices, and child self-regulation. This study targeted a specific population: rural single African American mothers. The researchers recruited 139 single mothers with children aged 6 to 9 years old to participate in this study. Two home visits were conducted to assess financial adequacy, maternal self-efficacy, and child self-regulation data. Child self-regulation data was gathered though mothers' and teachers' ratings of children's actions. In addition, maternal competence of parenting practices, mothers' capacity of involving in parenting practices, was collected through the combined information of family routines, mother-child interactions, and mothers' involvement in children's school activities. The results showed that maternal competence of parenting practices was positively associated with child self-regulation outcomes through a direct effect. In addition, maternal self-efficacy was positively associated with child self-regulation outcomes. However, the influence of maternal self-efficacy on child self-regulation outcomes was an indirect effect. It was found that maternal competence of parenting practices mediated the link between maternal self-efficacy and child self-regulation.

In conclusion, maternal self-efficacy was found to influence child self-regulation. This was due to the effect of maternal self-efficacy on mothering practices, which was found to further influence child self-regulation.

Different Dimensions of Maternal Self-Efficacy and Child Self-Regulation

This study adopted the Self-Efficacy for Parenting Task Index-Toddler Scale (SEPTI-TS) to measure maternal self-efficacy. There are seven subscales in the SEPTI-TS, and each subscale of SEPTI-TS represents a specific dimension of maternal self-efficacy. This formulation of maternal self-efficacy measure is classified as a domain-specific approach of maternal self-efficacy measure (Coleman & Karraker, 2003). This approach of measurement assesses mothers' ratings of their perceptions of parenting competence toward specific parenting tasks (Coleman & Karraker, 2003). The reason to adopt a domain-specific maternal self-efficacy measure is that the assessed maternal self-report data via this approach can more precisely reflect mothers' actual parenting behavior than via a domain-general or global approach of maternal self-efficacy measure (Bandura, 1989, see also Coleman & Karraker, 2003). In addition, many studies (Coleman & Karraker, 2003; see also Earley & Lituchy, 1991; Multon, Brown, & Lent, 1991; Pajares & Miller, 1995) have indicated that a domain-specific approach has better predictive validity than a domain-general or global approach of maternal self-efficacy measure.

Several empirical studies (Brody et al., 1999; Coleman & Karraker, 2003; Jackson & Scheines, 2005) have corroborated the association between maternal self-efficacy and child self-regulation. However, those studies only emphasized the total scores of measured maternal self-efficacy, but did not examine the relationship of each dimension

of maternal self-efficacy with child developmental outcomes separately. Therefore, the relationship between specific dimensions of maternal self-efficacy and child self-regulation performance remains unclear.

However, Kochanska's study (1990) can provide us insights and related evidence about this unclear association. Kochanska (1990) conducted a study to examine the association between maternal parenting beliefs and attitudes and mothers' parenting practices. In addition, the associations between maternal beliefs and children's behavior problems were also examined. The researcher recruited 68 mothers with their children aged 16 to 44 months. Mother-child interaction was videotaped in a laboratory apartment at two sessions: the time at first recruitment and when children were 5 years old. Maternal parenting strategies, such as direct/indirect commands, positive incentives, and prohibitive interventions, were coded from mother-child interactions, and whether children complied with these interventions were coded as well. In this study, the researcher classified maternal parenting beliefs as four patterns based on mothers' performing parenting strategies: *authoritarian/restrictive pattern* and *authoritative/democratic pattern*. The findings showed that mothers' authoritative/democratic pattern of parenting belief, such as rational guidance and encouragement of child independence, was positively associated with children's compliance. In addition, the authoritative/democratic pattern of belief was negatively associated with prohibitive interventions, which is the strategy that mothers used to try to stop/prohibit child behavior. Kochanska's study (1990) indicated that the positive pattern of maternal belief lets mothers effectively regulate children's behavior, and be prone to

using less negative parenting strategies (e.g., prohibitive) to respond to children's behavior.

Because little empirical evidence provided by previous studies has related to the difference of associations between specific dimensions of maternal self-efficacy and child self-regulation, this study will investigate this issue to understand the difference of associations between different maternal self-efficacy dimensions measured in this study and child self-regulation performance.

Child Gender and Maternal Self-Efficacy

Some studies have examined gender differences relative to maternal self-efficacy. However, the research findings of gender difference are not consistent. Maniadaki, Sonuga-Barke, Kakouros, and Karaba (2005) conducted a study to examine whether there was a gender difference of mothers' emotional response and self-efficacy beliefs for mothers' with children with AD/HD. The researchers recruited 118 mothers with their children aged 4 to 6 years old. Then the researchers collected data on maternal self-efficacy, mothers' attributions of children's problem behavior, such as severity and uncontrollability, mothers' emotional responses to hyperactive children's behavior, and children's behavior problems (e.g., inattention-hyperactivity and emotional symptoms). The results showed that more than 60% of mothers reported that they felt anxious and nervous about their children's hyperactive behavior. Moreover, it was found there was a significant gender difference of maternal self-efficacy for mothers with AD/HD children. Specifically, mothers indicated that they felt less confident of dealing with boys' AD/HD symptoms than girls'. However, it is problematic to generalize the findings of this study

about gender effect on maternal self-efficacy to the population because this study targeted children with AD/HD.

However, Jackson (2000) found different results about gender effects on maternal self-efficacy. Jackson (2000) examined whether maternal self-efficacy, mothers' social supports in parenting, and children's behavior problems predicted parenting stress. The researcher recruited 188 mothers for this study. All participants were African American single mothers, half of whom were unemployed, with children aged 3 to 4 years old. Participating mothers completed questionnaires about their perceived maternal self-efficacy, social support received from family and friends, children's behavior problems, and parenting stress. The results showed that there was no gender difference on the scores of maternal self-efficacy. In addition, maternal self-efficacy was negatively associated with parenting stress, but this association did not reflect gender differences.

In summary, the research findings about child gender and maternal self-efficacy are not consistent. In addition, the above studies targeted older children older. Thus, this study will investigate whether there is a gender difference on maternal self-efficacy measured in toddlerhood.

Socioeconomic Status and Maternal Self-Efficacy

Some studies have investigated whether family economic status or hardship is related to differences of maternal self-efficacy. Elder, Eccles, Ardelt and Lord (1995) conducted a study to examine the links among family income, maternal economic pressure, and maternal self-efficacy. The researchers recruited 429 families with children aged 11 to 15 years in their study. The majority of families in this sample were African American, and 80% of them were single mothers. Family income data included total

family income and unstable work that happened in the previous year. Data of family interactions included children's emotional behavior or affections toward parents, marital quality, and family strategies to managing stress they encountered.

The results of pathway analyses showed that, in general, family income or unstable work patterns influenced maternal self-efficacy, but this influence was an indirect effect. The economic pressure families encountered were found to mediate the path between family income, or unstable employment, and maternal self-efficacy. In addition, this study found that the mediation effect of economic pressure varied by ethnicity. For African American mothers, economic pressure mediated the path between family income, or unstable work events and maternal self-efficacy, which is negatively associated with economic pressure. However, for European American mothers, economic pressure did not mediate the path between family income, or unstable work events and maternal self-efficacy.

Brody et al. (1999) also investigated the correlation among a family's financial strain, maternal self-efficacy, mothering practices, and child self-regulation. The researchers particularly targeted rural single African American mothers to understand how their economic status influenced maternal self-efficacy, which further influenced children's developmental outcomes. Three subscales of the Family Resource Scale were used to understand family financial resources. Mothers rated the degree of adequacy of their financial resources to cover basic daily life needs, money for general expenses, and resources for extra expenses.

The pathway analysis results showed that the adequacy of mothers' financial resources were positively associated with maternal self-efficacy, which was found as a

direct effect. Specifically, African American mothers with plentiful financial resources had higher maternal self-efficacy and children with better self-regulation performance than African American mothers with impoverished financial resources.

The above studies suggest that family socioeconomic status relates to differences in mothers' perceived self-efficacy. However, it should be emphasized that the found socioeconomic status difference on maternal self-efficacy was from studies which targeted older children. Therefore, the current study will examine whether there is a socioeconomic status difference on maternal self-efficacy measured in toddlerhood.

Child Self-Regulation and Its Association with Maternal Self-Efficacy

Scaramella and Leve (2004) adopted the early childhood coercion model (ECCM) to describe the influence of parenting on the trajectory of child self-regulation. In this model, child early emotional reactivity led to different parenting behavior due to differences of his or her early temperament or developed self-regulation skills (Scaramella & Leve, 2004). Moreover, Putnam, Spritz, and Stifter (2002) also found a similar relationship between early child emotion regulation and maternal parenting strategies. Their longitudinal study examined young children's emotion regulation during early childhood. A lab task was designed to observe children's delay performance, emotional responses, and the strategies mothers and children used to regulate children's emotions. Their study found that mothers helped children regulate their arousals, but children's emotional reaction also regulated their mothers' emotional responses to children. If children displayed fewer emotional arousals, their mothers were found to reveal fewer negative emotions.

According to the above research, early child self-regulation performance was related to mother's parenting efficiency. However, it deserves further investigation as to whether children's early self-regulation is also related to mother's perceived self-efficacy.

The Association of Child Self-Regulation with Maternal Self-Efficacy

Many studies have examined the relationship between child early self-regulation and maternal self-efficacy. Most of these studies focused on young children with temperamental difficulties during infancy. Cutrona and Troutman (1986) conducted a study to examine the link among infants' difficult temperament, mothers' perceived social supports, maternal self-efficacy, and maternal postpartum depression. In their theoretical model, it was hypothesized that infants' difficult temperament was a stressor for the development of maternal postpartum depression. In addition, it was hypothesized that maternal self-efficacy was a mediator in the link between infants' difficult temperament and maternal depression, and the link between social supports and maternal depression. Fifty-five mothers were recruited to participate in this study during their pregnancy. There were two times of data collection. During the mothers' pregnancy, mothers' perceived social supports and maternal depression were measured. When their infants were three months, researchers gathered further data including maternal self-efficacy, maternal depression at three months postpartum, and mothers' perception of infants' temperamental difficulty.

The results of path analysis showed that maternal self-efficacy mediated the path between infants' difficult temperament and maternal depression, and the path between mothers' perceived social supports and maternal depression. Moreover, both social supports and infants' temperamental difficulty were found to have a direct effect on

maternal self-efficacy. Specifically, infants' difficult temperament was negatively associated with maternal self-efficacy, and mothers' perceived social supports were positively associated with maternal self-efficacy.

Leerkes and Crockenberg (2002) also conducted a study to examine the links among mothers' self-esteem, perceived partners' supports, child temperament, and maternal self-efficacy, and the influence of these factors on mothers' sensitivity. The sample included 92 pregnant mothers who were primarily well-educated, middle-class European American mothers. During pregnancy, the mothers completed questionnaires of maternal self-esteem and the parental care which mothers received from their parents during childhood. When infants were 5 months old, the researchers collected data on maternal self-efficacy, social support perceived from partners, and mothers' perceived infants' temperament. When infants were 6 months old, maternal sensitivity was videotaped in a laboratory playroom. The results showed that maternal self-esteem and infants' temperament, measured as soothability, were positively associated with maternal self-efficacy. In other words, parent rated easy temperament was associated with higher perceived maternal self-efficacy. In addition, there was an interaction effect on maternal self-efficacy attributable to infants' soothability and their distress reactions. In other words, when infants expressed distress responses to stimuli, mothers with easily soothed infants perceived higher self-efficacy than those whose infants were difficult to sooth.

Teti and Gelfand's study (1991) also examined the influence of mothers' perceived social supports and child temperament on mothers' self-efficacy, which further influenced parenting competence. The researchers conducted three home visits to collect data about infants' temperamental difficulties, maternal depression, received social

supports, and maternal self-efficacy. The results of the study showed that infants' difficulty was negatively associated with maternal self-efficacy. In addition, infants' difficulty interacted with mothers' depression in maternal self-efficacy. Depressed mothers rearing infants with lower levels of temperamental difficulty were rated to have higher maternal self-efficacy than those rearing infants with higher levels of temperamental difficulty.

In conclusion, research has suggested a relationship between maternal self-efficacy and child temperament (Bandura, 1977). Mothers with low parenting self-efficacy view children's emotional reactivity as a challenging task with high difficulty and feel anxious about these emotional responses from their children. However, mothers with high parenting self-efficacy try to adjust their parenting strategies to deal with this situation because they believe they will effectively solve this problem.

Moreover, it should be addressed that the above research findings about child self-regulation problem associated with maternal self-efficacy targeted infancy. It should be worthwhile exploring whether this association also exists during toddlerhood. Thus, this study will investigate whether child early self-regulation performance assessed in toddlerhood is associated with maternal self-efficacy.

The Influences of Specific Aspects of Child Dysregulation

The current study has adopted the Infant-Toddler Social and Emotional Assessment to assess children's dysregulation information. This scale assesses four dysregulation problems: negative emotionality, sensory sensitivity, eating, and sleep. Several studies have examined the influences of these dysregulation problems on parenting behavior and child developmental outcomes.

Negative Emotionality

Negative emotionality can be defined as temperamental characteristics displaying behaviors with anger, frustration, and hostility (Eisenberg, Cumberland, Spinrad, Fabes, Shepard, Reiser, et al., 2001). Braungart-Rieker, Garwood, and Stifter (1997) examined relationships among child early temperament, mothers' controlling styles, and child compliance during toddlerhood. They found that mothers with toddlers rated high in negative emotionality performed less guidance and were more controlling to their toddlers' behavior. In addition, toddlers with mothers who preferred using controlling rather than guidance showed less compliance to mothers' demands. Pauli-Pott, Mertesacker, Bade, Bauer, and Beckmann (2000) conducted a study to examine the relationship among infant negative emotionality, mothers' depression and emotional support, and mothers' reactivity/sensitivity. The results showed that infant negative emotionality moderated the effect of maternal depression on mothers' reactivity/sensitivity.

Sensory Sensitivity

Sensory sensitivity/reactivity can be identified as sensitivity to external touch, strong reactions to stimuli, or abnormal responses to loud and sudden noises (Carter & Briggs-Gowan, 2005). Higher levels of sensory sensitivity indicate poor self-regulation capacity. Degangi, Breinbauer, Roosevelt, Porges, and Greenspan (2000) conducted a study to compare differences of infants' sensory sensitivity and dysregulation performance between normal developed and self-regulatory deficiency infants. Recruited infants were 36 months old. They found that infants with sensitivity problems had delayed development in motor, language, and cognitive skills.

Eating

Some studies examined the influences of infant eating problems on later developmental outcomes. Hagekull and Bohlin's longitudinal study (2004) found that child eating problems assessed during infancy (e.g., picky eating) and other psychosomatic symptoms were associated with their later emotion regulation problems in middle childhood. However, most of the research related to eating problem influences mainly focused on the relationships of highlighting obesity or eating disorders with later self-regulation problems (Hatfield, 2007). In addition, most evidence of these relationships was found in the period of adolescence, but fewer studies explored these relationships in toddlerhood. Therefore, whether or not toddler eating problems influence parents' parenting practices needs further investigation.

Sleep

Poor sleep patterns have been observed to be related to children's regulatory problems. Burnham, Goodlin-Jones, Gaylor, and Anders (2002) conducted a study to understand the influence of infants' sleepwake patterns and to identify predictors to infants' self-soothing behaviors. Eighty infants participated in a lab study across 5 times. The results showed high levels of quiet sleep at birth and longer response times from parents to infants' awakening at 3 months could predict infants' self-soothing at 12 months. In other words, infants' sleep problems led to their future poor self-regulation performance. In addition, Gregory and O'Conner (2002) found that the occurrence of sleep problems at 4 years old predicted poor behavioral or emotional problems in middle adolescence, such as anxiety, depression, and delinquent behavior.

Thus far, many studies have investigated the association between children's early

dysregulation problems and their developmental outcomes, but little empirical evidence has established the association between toddlers' early dysregulation problems and mothers' parenting self-efficacy. Therefore, this study will investigate the relationships between early dysregulation problems and maternal self-efficacy during toddlerhood.

Child Gender and Child Self-Regulation

Some studies have investigated gender differences of child self-regulation development. Raffaelli, Crockett, and Shen's longitudinal study (2005) indicated a gender difference in child self-regulation development. Using National Longitudinal Survey of Youth (NLSY) data, they selected three cohorts of children ranging in age from 4 to 12 years. The results showed the influence of gender on child self-regulation across all three age groups with girls exhibiting a higher capacity for self-regulation than boys. The researchers argued that this gender difference in child self-regulation might be due to the gender difference in child neurological development ("differential maturation"), or different expectations and socialization from parents (Raffaelli et al., 2005, p. 71).

However, fewer empirical studies have examined the gender difference on child self-regulation developmental outcomes for children at toddlerhood. Thus, this study will investigate whether there is a gender difference on toddlers' self-regulation development.

Socioeconomic Status and Child Self-Regulation

Ecological risk, especially poverty, has also been proposed as having a negative influence on child developmental outcomes, including emotional development. It has been found that low-income parents, such as single mothers or parents living in poverty, have children with poorer developmental outcomes than children with upper to middle

socioeconomic status parents, including poorer cognitive functions (McLoyd, 1998), physical health (McLoyd, 1998), achievement performance (Howse, Lange, Farran, & Boyles, 2003), externalizing and internalizing behavior problems (McLeod & Shanahan, 1993), delay of gratification performance (Golden, Montare, & Bridger, 1977; Newman & Kanfer, 1976; Reitman & Gross, 1997), and self-regulation (Kim, Brody, & Murry, 2003; Newman & Kanfer, 1976; Reitman & Gross, 1997).

Families in the lower socioeconomic strata often experience many ecological stressors, such as family violence, negative life events, parental mental health problems, high risk living environments, and community violence (McLoyd, 1998; Raver, 2004). These stressors not only affect child developmental outcomes, but parenting styles as well. Reitman et al. (1997) argued that poorer parents spend more time working, and thus may not have enough time to monitor and coach their children in the effective methods of regulating desires and behaving appropriately.

Barbarin and Richter (2001) conducted a study to investigate the relationships among the levels of community violence, family economic status, and child behavioral and emotional problems. Their data source was Southern African mothers living in black urban townships registered in a longitudinal study. The researchers recruited 750 six year-old children from the registered data pool, and 625 of them were successfully interviewed. The majority of sample was African (90.5%). Home interviews were conducted to collect data of community danger, economic status, and child developmental outcomes, such as emotional dysregulation and behavioral disorders. The researchers classified economic status into low, moderate, and high groups, based on the standardized scores of household economic index: material consumption and financial

capital. The result showed that children living in high economic status were rated significantly higher in self-regulation scores than those living in low or moderate economic status.

Additionally, Miech, Essex, and Goldsmith (2001) conducted a study to examine the relationship among child self-regulation, socio-economic status, and child school adjustment outcomes. Their data source was from a large-scale, longitudinal study. The researchers recruited 550 infants, but only 451 of them were included into analysis because these children's self-regulation data was available when they were 4.5 years old. The collected data included self-regulation rating, social relationship problems at school, hyperactive-attention deficient rating, and teachers' rated scholastic ability. The socio-economic status variable was based the family income assessed during maternal pregnancy, and again at child aged 1 and 4.5 years old. This study found that family income positively correlated to child self-regulation rating at all age points. Specifically, children living in higher income families were rated with better self-regulation performance than those living in lower income families.

In conclusion, the above studies indicated that children living in higher socio-economic status were rated with better self-regulation developmental outcome than those living in lower socio-economic status. However, it should be addressed that the samples are children older than toddler age; little empirical research examined whether socio-economic status is related to the difference of child self-regulation developmental outcome for children during toddlerhood. Therefore, this study will examine the possible relationship of family socioeconomic status with toddlers' self-regulation.

Overview of the Present Study

The present study examined the relationship between maternal self-efficacy and toddlers' self-regulation. The data for this study originated from the Infant Preschool Predictors of School Readiness (IPPSR) project. Specifically, this study investigated whether specific dimensions of maternal self-efficacy were associated with toddlers' self-regulation performance. Additionally, the relationships among specific aspects of toddlers' dysregulation and maternal self-efficacy were examined. Moreover, gender and family socioeconomic status of children at the age of 2 years are hypothesized to be associated with differences in maternal self-efficacy and child self-regulation. Thus, this study examined whether there were child gender or family socioeconomic status differences in the scores of maternal self-efficacy and toddlers' self-regulation. The proposed model of these relationships is presented in Figure 1.

Research Questions

1. What is the relationship between child gender or family socio-economic status and maternal self-efficacy and toddlers' self-regulation performance at 2 years old?
2. What is the relationship between maternal self-efficacy and toddlers' self-regulation? Moreover, what is the relationship between specific dimensions of maternal self-efficacy and toddlers' self-regulation? Particularly, among measured dimensions of maternal self-efficacy, which specific maternal self-efficacy dimension is associated with toddlers' self-regulation at 2 years old?
3. Which specific maternal self-efficacy dimension has the strongest relationship with toddlers' self-regulation? Specifically, among measured dimensions of

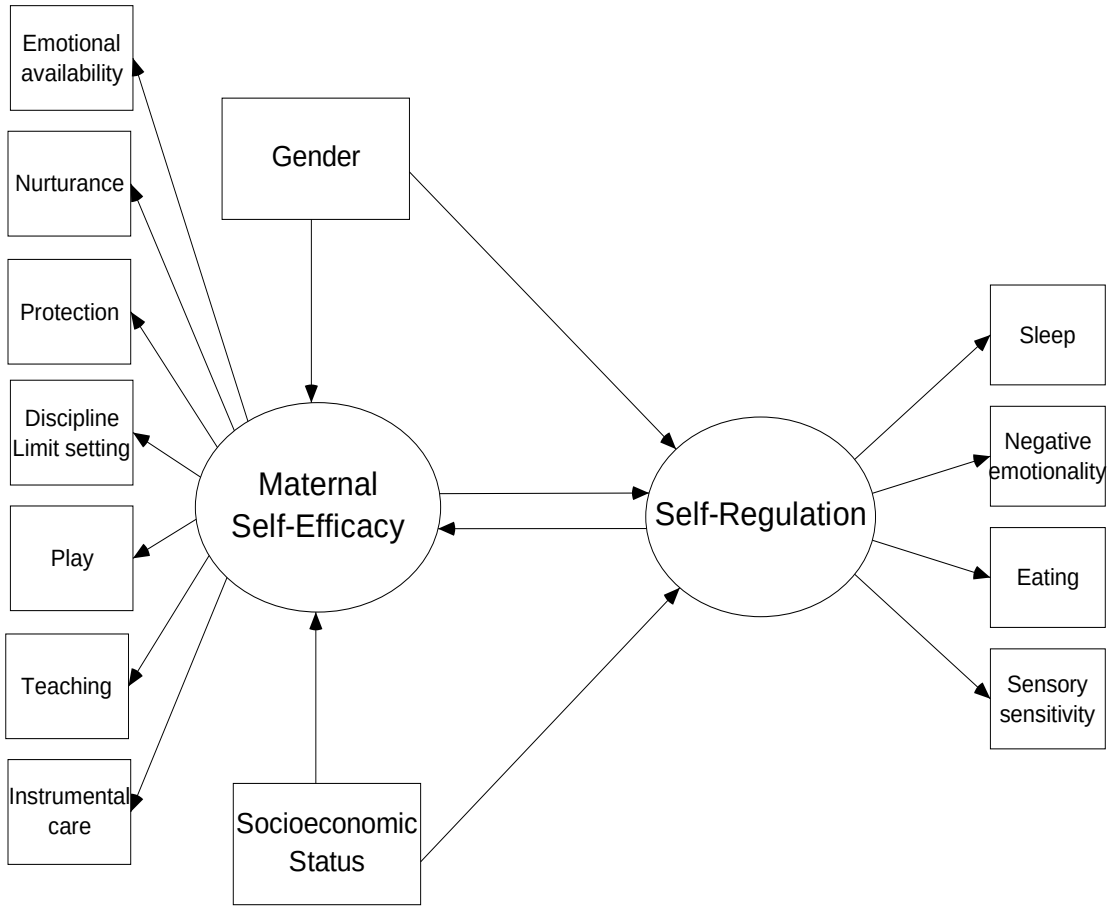


Figure 1. *Model of maternal self-efficacy effect on toddler self-regulation development*

maternal self-efficacy, which specific maternal self-efficacy dimension contributes the most variance on the association with toddlers' self-regulation performance at 2 years old?

4. What is the relationship between aspects of toddlers' dysregulation and maternal self-efficacy? Specifically, among measured aspects of toddlers' dysregulation at 2 years old, which specific toddlers' dysregulation aspect is associated with maternal self-efficacy?
5. Which aspect of toddlers' dysregulation has the strongest relationship with maternal self-efficacy? Specifically, among measured aspects of toddlers' dysregulation at 2 years old, which specific toddlers' dysregulation aspect contributes the most variance on the association with maternal self-efficacy?

Hypotheses

1. Child gender and family socio-economic status assessed at 2 years old will be associated with differences on the scores of 2-year child self-regulation and reported maternal self-efficacy. It is hypothesized that girls will demonstrate higher levels of self-regulation than boys, and children living in lower socio-economic status will demonstrate lower levels of self-regulation than children living in higher socio-economic status. Moreover, it is hypothesized that mothers with daughters will report higher self-efficacy than with sons, and mothers living in lower socio-economic status will report lower self-efficacy than mothers living in higher socio-economic status.
2. It is hypothesized that maternal self-efficacy will be positively associated with child self-regulation at 2 years old. Specifically, higher maternal self-efficacy

will be associated with better self-regulation performance (or fewer dysregulation problems). More particularly, it is hypothesized that higher maternal self-efficacy will be associated with better child self-regulation performance (or fewer dysregulation problems) regardless of which specific dimension of maternal self-efficacy is measured in this study.

3. It is hypothesized that higher maternal self-efficacy in the dimension of instrumental care will contribute more variance than any other measured dimensions of maternal self-efficacy on the association with toddlers' better self-regulation performance.
4. It is hypothesized that each aspect of child dysregulation at 2 years will be negatively associated with maternal self-efficacy. Specifically, higher levels of 2 year child dysregulation will be associated with lower maternal self-efficacy regardless of which specific aspect of child dysregulation at 2 years is measured in this study.
5. It is hypothesized that higher levels of negative emotionality, one aspect of child dysregulation, will contribute more variance than any other measured aspects of child dysregulation at 2 years on the association with lower maternal self-efficacy.

CHAPTER 3: METHODOLOGY

The present study relies on secondary analysis of the data collected during the research project, Infant Preschool Predictors of School Readiness (IPPSR). The IPPSR research project consisted of two phases to examine the infant and preschool predictors of school readiness.

The first phase of the IPPSR study began in 2005 when participating children were young infants. This stage assessed infants' learning, processing speed, and physiological self regulation. In this project, assessed infant data was used to examine whether these variables can predict school readiness (Wass, Hallam, & Moran, 2006).

The second phase of this research initiated in 2007 when participating children were 2 to 3 years old. In this stage, the researchers assessed toddlers' characteristics, such as temperament, social and emotional competence, family characteristics (e.g. parenting stress, parenting self-efficacy, income), and quality of out-of-home care that should contribute to school readiness. The purpose of this stage was to examine whether the infant and family characteristics assessed at 3 months of age were associated with outcomes assessed at 2-3 years old (Wass, et al., 2006).

Research Participants

In the first phase of the IPPSR study, the recruited eligible participants were 165 families with newborn babies aged 12 to 14 weeks. Most of the participating families were recruited from Knox and surrounding counties in the state of Tennessee. The exclusion criteria for the first stage participants included low birth weight, prematurity, or required hospitalization (Wass, et al., 2006). As a result, 117 families were available for follow-up in the second stage.

In the second phase of this research, the 117 families included in the first stage were invited to participate in the second stage. In the end, 97 families agreed to participate in the follow-up research. The children recruited in the second stage were 27-35 months (mean age: 29.77 months). The majority of participant parents were mothers, although fathers were not actively excluded. If the primary participant indicated that her or his spouse or a partner would also like to participate, the copies of questionnaires were mailed to them for completion. Data for this study were all collected during this second phase of the project.

Methods

Initially, parents were contacted by phone and the research team explained the study and invited the parent to participate. If the parent agreed to participate, the team member scheduled a phone interview to collect demographic data. Then the recruited parent took her or his infant to the Infant Development Research Center when the child was 3 months old. In this stage, the researcher assessed infant data of self-regulation of attention using HFHPV, spatial learning, and processing speed (Wass, et al., 2006).

In the second stage of the IPPSR study, parents recruited in the first stage were contacted by phone. The research team explained the purpose of the second stage and invited the parent to participate in this stage of the research study. If the parent agreed to participate, the team member scheduled a phone interview to collect demographic data again, and mailed a packet of questionnaires to be completed prior to the phone interview (Wass, et al., 2006).

In the second stage, the mailing material included a packet with a cover letter, a participant information form, two copies of the informed consent document,

questionnaires, and a postage-paid return envelope (Wass, et al., 2006). Parents completed the materials at home and returned the materials via mail. It was anticipated that the questionnaires would take approximately 75 minutes to complete. Parents were asked to return the questionnaires prior to the phone interview. The research team reviewed parent responses for errors (e.g., 2 responses circled) to correct during the interview. The team member then conducted the phone interview. This phone interview lasted approximately 15-20 minutes and included a demographic interview and a child temperament survey. All data reported in the present study was collected during the second phase of data collection.

Family Demographics

According to the demographic data gathered in the second stage of IPPSR study, 50% of recruited children were boys and 50% were girls. The majority of participants were non-Hispanic European Americans (86.5%). In addition, 97 % of the recruited parents were married. In respect to family financial status, 28.1% of participating families' income-to-needs ratio was less than 2.5. In other words, 28.1% of participating families' annual income before tax was less than 2.5 times the poverty level. The information on percentage distribution of family demographics is listed in Table 1.

Measures

Family demography

Family demographic information was gathered through the *Demographic, Medical and Quality of Care Questionnaire*. The research team gathered demographic information from primary caregivers through phone interviews. Demographic information included child gender, family income, ethnicity of parents and child, parents' education, marital

Table 1.

Percentage of IPPSR Child and Family Demographic Characteristics at Two Years Old

Variables	Number	Percentage
Child Gender		
Male	48	50.0
Female	48	50.0
Ethnicity		
European American, non-Hispanic	83	86.5
African American, non-Hispanic	2	2.1
American Indian	1	1.0
Hispanic	3	3.2
Greek	1	1.0
Not reported	6	6.3
Socio-economic Status		
Income to needs ratio less than 2.5	27	28.1
Income to needs ratio above 2.5	68	70.8
Marital Status		
Married	87	90.6
Unmarried	8	8.3

status, and medical history. This questionnaire also contained five questions drawn from the *Quality of Care Questionnaire* to understand families' child care condition.

Child Gender

In the IPPSR data collection, child gender variable (Gender) was coded *1* for boys and *2* for girls. According to the finished IPPSR data collection, there were 48 boys and 48 girls participating in the second stage of the study. In this study dummy coding is used to compare different gender groups for any differences in maternal self-efficacy and child self-regulation at 2 years old. In this study, boys are dummy coded as *0* and girls as *1* to compare the gender effect on maternal self-efficacy and 2-year child self-regulation.

Family Socio-Economic Status

The selected criterion to classify families' socio-economic status is their income-to-needs ratio. This ratio is calculated based on annul income and the poverty level. The poverty level used in this study is calculated according to U.S. federal poverty thresholds. The threshold of poverty is defined as total annual household income below the poverty threshold. The criterion to classify participating families as living in poverty was based on 2006 poverty threshold. People were defined as living in poverty when their total amount of annual income earned before taxes for two adults and one child was less than $15,720, or the income for two adults and two children was less than $19,806 in 2006 (Mulligan & Flanagan, 2006).

In the IPPSR data pool, the family income variable consisted of data of the total amount of money earned in participants' family household before taxes. The income to needs ratio variable was then created. This ratio was the total amount of money earned in participants' family household before taxes divided by the 2006 poverty threshold. The

poverty threshold was varied based on the number of people living in a home for the past 12 months.

The criterion to classify family socio-economic status is that the income-to-needs ratio is lower or higher than 2.5. If the participants whose income to needs ratio is lower than 2.5, they are classified as lower socioeconomic status (lower SES) families, and they are dummy coded as *1*. The other participants whose ratio is higher than 2.5 are classified as higher socioeconomic status (higher SES) families, and they are dummy coded as *0* as a reference group, which was used to compare the socioeconomic status effect on maternal self-efficacy and 2-year child self-regulation to lower socioeconomic status group.

Parenting Self-Efficacy Measurement (Appendix A)

The Self-Efficacy for Parenting Task Index-Toddler Scale (SEPTI-TS) was used to assess the construct of parental self-efficacy. This measure was originally developed to assess parental self-efficacy (Coleman & Karraker, 2003). There are 53 items on the SEPTI-TS, categorized into seven subscales: (1) emotional availability, (2) nurturance, valuing the child, and empathetic responsiveness, (3) protection from harm or injury, (4) discipline and limit setting, (5) play, (6) teaching, and (7) Instrumental care and establishment of structure and routines. The response to each item is rated on a six-point Likert scale, and the rating score ranged from 6 as "Strongly Agree" to 1 as "Strongly Disagree." Parents are asked to rate the degree of their perceptions of beliefs toward each parenting action. The higher scores of this measure mean that the respondent has stronger perceived belief of parenting self-efficacy (Coleman & Karraker, 2003).

Coleman and Karraker (2003) used middle-class mother–toddler pairs as their

sample to examine the psychometric properties of this measure. The Cronbach's alpha coefficients for each subscale was Emotional Availability .67, Nurturance .71, Protection .53, Discipline .81, Play .92, Teaching .73, and Instrumental Care .46. Moreover, the Cronbach's alpha coefficient of the whole measure was .91. Furthermore, the results of validity examinations showed that the SEPTI-TS was significantly correlated with scores on the seven-item Efficacy subscale of the Parenting Sense of Competence Scale ($r(66) = .48$, $p < .001$), and the Self-Efficacy Scale, a 17-item general self-efficacy ($r(66) = .32$, $p < .01$) (Coleman & Karraker, 2003). In addition, the scores of parenting self-efficacy beliefs were also significant predictors of parenting competence and child developmental status and behavior (Coleman & Karraker, 2003).

In the current study, all subscales were included in the analyses. Seven subscales with a total of 53 items were included in the analyses. Some example items are as follows: Emotional Availability (items 1 to 7), "Providing physical comfort for my child is easy for me"; Nurturance/Valuing/ Empathetic Responsiveness (items 7 to 15), "I am able to sense when my child is starting to become distressed"; Protection (items 16 to 22), "I always make sure I can see my child in order to make sure he/she does not get hurt"; Discipline/Limit Setting (items 23 to 29), "Setting limits for my toddler is relatively easy for me"; Play (items 30 to 36), "I am a fun playmate for my toddler"; Teaching (items 37 to 45), "Sitting down regularly with my child to read or do some other one-on-one activity is not difficult for me"; Instrumental Care/ Structure/ Routines (items 46 to 53), "I am able to provide my child with a comfortable amount of daily structure." The Self-Efficacy for Parenting Task Index-Toddler Scale is in Appendix A.

In addition, items 4, 7, 13, 16, 22, 23, 24, 25, 27, 28, 32, 35, 38, 40, 41, 42, 45, 49,

50, 51, and 52 were negative questions, so data of these items were reverse-scored (Coleman & Karraker, 2003). The score of each subscale is the sum of items of that subscale. Higher scores of specified SEPTI-TS subscales indicate that the parent has higher parenting self-efficacy belief of a specified parenting pattern. In addition, the composite of all items of the SEPTI-TS scale is the score of parenting self-efficacy of the overall scale. Higher scores for the whole scale signify that the parent has higher parenting self-efficacy belief (Coleman & Karraker, 2003).

Child Self-Regulation Measurement (Appendix B)

Children's self-regulation problems were assessed through the *Infant-Toddler Social and Emotional Assessment (ITSEA).* This questionnaire was developed by Carter and Briggs-Gowan (1993). There are four main subscales in ITSEA: Externalizing, Internalizing, Dysregulation, and Competencies Domain (Carter, Briggs-Gowan, Jones, & Little, 2003). In addition, the last subscale of ITSEA: Maladaptive, Atypical Behavior, and Social Relatedness was used to assess more serious problems (Carter, et al., 2003). However, this study only considers the Dysregulation Domain subscale of ITSEA because it targets children's self-regulation problems. The Dysregulation Domain scale consists of four subscales: Sleep, Negative Emotionality, Eating, and Sensory Sensitivity (Carter, et al., 2003).

There were 166 items in the whole scale. Each item was rated on a three-point scale: 0 as *Not true/rarely*, 1 as *Somewhat true/sometimes*, and 2 as *Very true/often*. Parents are asked to rate the degree of their perceptions of their children's behavior problems. In addition, the "No opportunity" code means that parents can "indicate that they have not had the opportunity to observe certain behaviors (e.g., behavior with peers)" (Carter, et

al., 2003, p. 500).

Carter, Briggs-Gowan, Jones, and Little (2003) conducted a study to examine the psychometric properties of ITSEA. The Alpha coefficients evaluated for 1,235 participants were 0.86 for the Dysregulation Domain scale, 0.78 for the Sleep subscale, 0.84 for the Negative Emotionality subscale, 0.78 for the Eating subscale, and 0.63 for the Sensory Sensitivity subscale. In addition, the test-retest coefficients for all subscales ranged from 0.82 to 0.90 and from 0.69 to 0.85 for the whole measure. Furthermore, the results of validity analyses showed that all ITSEA subscales were significantly correlated to each subscale of the *Child Behavior Checklist*: Internalizing, Externalizing, and Total Problem subscales. In addition, subscales of ITSEA were also significantly correlated to each subscale of the *Colorado Child Temperament Inventory*, which is used to assess child temperament with five subscales: emotionality, sociability, soothability, attention, and activity. Moreover, it was found that ITSEA was significantly correlated to the *Beck Anxiety Inventory*, which is used to measure common symptoms of anxiety.

This study targeted young children's self-regulation problems, so only the Dysregulation Domain subscale of ITSEA was considered, instead of the whole instrument. There are 34 items in the Dysregulation Domain scale, including Sleep (5 items), Negative Emotionality (13 items), Eating (9 items), and Sensory Sensitivity (7 items) subscales (Carter, et al., 2003). Some sample items are listed in the following: Negative emotionality ("wakes up grouchy or in a bad mood" and "gets angry or pouts"); Sensory sensitivity ("is bothered by loud noises or bright lights"). The details of Dysregulation Domain subscale of the Infant-Toddler Social and Emotional Assessment are included in Appendix B.

The score of children's self-regulation is the sum of scores of all Dysregulation Domain items. In addition, only one item in the Eating subscale needed to be reverse-scored ("Accepts new foods right away"). The higher scores of Dysregulation Domain scale indicate that the children have higher level of dysregulation or experience more self-regulation problems than those were rated with lower dysregulation scores. The constructs and some sample items of measures used in this study are listed in Table 2.

Moreover, raw scores of the composite Dysregulation Domain scale and each subscale of this domain scale were standardized before processing analyses. This is because the raw score distributions of the composite and each subscale of Dysregulation Domain scale are skewed. In order to normalize the raw score distributions, standardizing raw scores is necessary before conducting analyses. In this study, all raw scores are transferred into T scores, as recommended by the scoring manual of ITSEA (Carter & Briggs-Gowan, 2005).

Analysis Plan

Initially, the collected data was entered into the statistic package, SPSS 15.0. Then the *t*-test was used to examine whether there were child gender and socioeconomic status differences on the scores of maternal self-efficacy and child self-regulation ratings (Hypothesis One). There were three assumptions needed for the use of the *t*-test: the independence assumption, the normality assumption, and the equality of variance assumption (Norušis, 2005).

Table 2.

Constructs of IPPSR Family Demography, Child Self-Regulation, and Parenting Self-Efficacy Measurements

Measure	Constructs	Sample Items
Family Demography		
Gender	Child gender	• What is your child gender?
Ethnicity	Child ethnicity	• What is your child ethnicity?
Socio-Economic Status	Demo27	• What was the total amount of money earned in your household before taxes?
	PovThresh	• 2005 Poverty Threshold
	IncToNeeds	• Income to Needs (poverty threshold) Ratio
Parental Self-Efficacy		
	Emotional Availability	• I believe that I adequately meet my child's needs to feel secure and accepted.
	Nurturance/Valuing/ Empathetic Responsiveness	• My toddler knows that I understand when his/her feelings are hurt.
	Protection	• When I leave my child in someone else's care, I make sure that the substitute care provider will be capable of protecting my child from harm.
SEPTI-TS	Discipline / Limit Setting	• Other parents seem to have more success with setting limits for their children than I do with my child.
	Play	• I can always think of something to play with my child.
	Teaching	• I believe my toddler learns a great deal from my efforts to show him/her things.
	Instrumental Care/ Structure/ Routines	• I have been able to establish a daily routine with my toddler that feels comfortable to both of us.

Table 2. Continued.

Measure	Constructs	Sample Items
Child Self-Regulation		
ITSEA - Dysregulation Domain	Sleep Negative emotionality Eating Sensory sensitivity	• Must be held to go to sleep. • Wakes up grouchy or in a bad mood. • Refuses to eat foods that require chewing. • Is bothered by loud noises or bright lights.

Note. The full copies of utilized IPPSR parenting self-efficacy and child self-regulation measures are listed in Appendix A and B.

In the present dataset, mother or child data was collected individually to ensure that each participant's data was not related to another's, which verified the independence assumption. The scores of dysregulation have been standardized, so their distributions have been normalized. In addition, Q-Q plot was used to examine the normality of maternal self-efficacy scores (Norušis, 2005). This data was found clustered around the straight line in Q-Q plot. Thus, the score distributions of dysregulation and maternal self-efficacy verified the normality assumption. In addition, the Levene test was conducted to examine the equality of variance (Norušis, 2005). The results of this test were not significant between boys and girls, or between higher and lower income groups. Thus, the equal variances between groups were assumed, which verified the equality of variance assumption.

Among these *t*-test analyses, the maternal self-efficacy variables were the composite scores and the scores of each subscale on the SEPTI-TS. The maternal self-efficacy subscales were emotional availability, nurturance, protection, discipline / limit setting, play, teaching, and instrumental care. In addition, the child self-regulation variables were the composite scores and each sub-domain score of the child self-regulation measurement according to the dysregulation domain of ITSEA. The measured aspects of child dysregulation included problems of eating, negative emotionality, sensory sensitivity, and sleep. Moreover, the composite scores and each sub-domain score of child dysgulation ratings were standardized into T scores before conducting analyses.

Bivariate correlation analyses were conducted to examine the relationship between child self-regulation and maternal self-efficacy, and relationships between child self-

regulation and specific dimensions of maternal self-efficacy (Hypothesis Two). The targeted variables among these analyses were child dysregulation problems. The composite scores of these dysregulation problem ratings via the dysregulation domain of ITSEA were correlated to the composite scores and each subscale score of the SEPTI-TS maternal self-efficacy measurement. Maternal self-efficacy subscales included emotional availability, nurturance, protection, discipline / limit setting, play, teaching, and instrumental care.

The Pearson correlation coefficient was the statistic used to represent the degree and direction of these correlations. The assumption of bivariate correlation was that the distributions of paired variables were normal (Cohen, Cohen, West, & Aiken, 2003). This assumption has been verified with data of dysregulation and maternal self-efficacy that their distractions could be viewed as normal ones.

The same as examining Hypothesis Two, bivariate correlation analyses were also adopted to examine relationships between maternal self-efficacy and each aspect of child self-regulation (Hypothesis Four). The targeted variables among these analyses were maternal self-efficacy. The composite scores of the maternal self-efficacy measurement SEPTI-TS were correlated to each aspect of child dysregulation, which was the score of each sub-domain in dysregulation domain of ITSEA. The aspects of child dysregulation problems measured in this study were eating, negative emotionality, sensory sensitivity, and sleep.

Furthermore, a linear hierarchical regression model was used to examine which specific dimension of maternal self-efficacy contributed the most variance on the association with toddlers' self-regulation performance at 2 years old (Hypothesis Three).

In order to answer this research question, a stepwise selection method was considered in this regression model.

The stepwise regression selection strategy was a statistical strategy that helped investigators select several predictors in a regression model that could explain a certain degree of unique variance associated with the dependent variable (Cohen et. al., 2003). Specifically, a variable can be added in the regression model only if it reaches a significant criterion in the variance accounted for in the dependent variable (Cohen, et al., 2003). The threshold of significance level used in this study was alpha < .15 (Bendel & Afifi, 1977). In other words, the selected predictors were those whose incremental contribution to the regression was significant at $p < .15$ (Bendel & Afifi, 1977).

In the stepwise regression model to examine Hypothesis Three, the criterion variable was child dysregulation ratings, which were the composite scores of the dysregulation domain of ITSEA. The predictors of this model were measured dimensions of maternal self-efficacy, which were the scores of each subscale of SEPTI-TS including emotional availability, nurturance, protection, discipline / limit setting, play, teaching, and instrumental care. Also, child dysregulation rating scores were standardized into T scores before conducting analysis due to its skewed distribution.

There were four assumptions for the use of regression analysis. The first assumption was the independence assumption that each observation in either the same group or in different groups was not related to the others. The second, the normality assumption, assumed that the distribution of the independent and dependent variables was normal. The third one was the equality of variance assumption that assumed that the variances of all independent and dependent variables were equal. The final assumption

was that there was a linear relationship between independent and dependent variables (Cohen et. al., 2003). In the present dataset, the first three assumptions were verified in the preliminary analyses before confuting the *t*-test. In addition, the plots of standardized residuals of all maternal self-efficacy dimension scores against child dysregulation scores were used to evaluate the linear relationship between independent and dependent variables (Norušis, 2005). From these plots, the data scattered toward a tendency of a line. Thus, the fourth assumption could be supported by the data of this study.

Because child gender and family socio-economic status might influence maternal self-efficacy dimensions and child self-regulation, the effects of child gender and family socio-economic status needed to be controlled when conducting this regression analysis. Therefore, in this linear hierarchical regression model, child gender and family socio-economic status variables were added into the first layer of this regression model prior to maternal self-efficacy dimensions so that the effects of gender and socio-economic status were controlled. Then, all measured dimensions of maternal self-efficacy in this study were added into the second layer of this regression model. Finally, a stepwise regression selection strategy was conducted to select predictors that fulfilled the threshold of selection at alpha < .15.

In addition, when conducting regression analyses, the multicollinearity was examined together with regression analyses. It might offer an interpretation of the regression analysis results if the multicollinearity issue existed. The statistic *tolerance* was used to interpret multicollinearity in this study. If the value of *tolerance* was larger than .1, the issue of multicollinearity was not problematic. The values of *tolerance* were adopted to examine multicollinearity in the regression analyses of this study.

Moreover, the variable child gender was dummy coded before being added into the regression model, and its coding reference group was male. Family socioeconomic status was also dummy coded before being added into the regression model, and its coding reference group was the group of higher socioeconomic status (SES) families, whose income to needs ratio was above the 2.5 poverty level.

The same as examining Hypothesis Three, a linear hierarchical regression model via a stepwise selection method was utilized to examine the specific aspect of child dysregulation that contributed the most variance on the association with maternal self-efficacy (Hypothesis Five). In the regression model to examine Hypothesis Five, the criterion variable was maternal self-efficacy, which was the composite scores of SEPTI-TS maternal self-efficacy measurement. The predictors of this model were measured aspects of child dysregulation, which were the scores of each sub-domain in dysregulation domain of ITSEA, including eating, negative emotionality, sensory sensitivity, and sleep.

In addition, the effects of gender and socio-economic status were also controlled when conducting this regression analysis via the same analysis steps to examine Hypothesis Three. Moreover, the coding method for the variables of child gender and socioeconomic status (SES) were the same as used for Hypothesis Three.

CHAPTER 4: RESULTS

Descriptive Statistics of Study Variables

The descriptive statistics of IPPSR participants were reported in Table 3. These statistics included participants' socioeconomic status information (e.g., annual income and income to needs ratio), and the composite and subscale scores of both maternal self-efficacy and child dysregulation measures.

The average participants' annual before tax income was $ 77,353.48, which was higher than the average annual income of Americans. The income to needs ratio was 4.15. This indicates that, on average, the IPPSR participants' annual income was 4.15 times greater than the 2006 poverty threshold (e.g., less than $19,806 per household for a family of four).

There were 34 items in the Dysregulation Domain of The Infant–Toddler Social and Emotional Assessment (ITSEA), and the potential range of Dysregulation Domain ranges from 0 to 68 (Carter, Briggs-Gowan, Jones, & Little, 2003). The mean raw scores of participating children's dysregualation rating scores was .44. In addition, the mean of these rating scores after being transferred to T scores was 43.22. Higher scores on this domain meant that mothers reported more frequent child dysregulation problems. ITSEA scores reported in the work of Carter et al. (2003) showed that for children aged 18-23 months, the mean score of Dysregulation Domain was .46; for children aged 24-29 months, the mean score of was .45, and for children aged 30-36 months, the mean score was .48. In that study, the sample size was 1,235 children with a mean age of 23.8 months.

Table 3.

Descriptive Statistics of IPPSR Measures

Variables	Mean	S.D.
Socio-economic Status (SES)		
Money earned before taxes	77,353.48	53,722.10
Income to Needs Ratio	4.15	3.29
Self-Regulation		
ITSEA – Dysregulation [a.]	.44	.24
ITSEA – Dysregulation [b.]	43.22	12.51
Eating [a.]	.48	.37
Negative Emotionality [a.]	.50	.29
Sensory Sensitivity [a.]	.33	.30
Sleep [a.]	.42	.47
Self-Efficacy		
SEPTI-Total	272.84	26.90
Emotional Availability	37.04	4.92
Nurturance	42.09	4.85
Protection	36.61	4.83
Discipline / Limit Setting	33.67	5.73
Play	34.23	6.86
Teaching	48.31	5.36

Note. Sample size except SES variables = 96; sample size of SES variables = 95

[a.] Reported by raw scores

[b.] Reported by standardized (T) scores

There were 53 items in the Self-Efficacy for Parenting Task Index-Toddler Scale (SEPTI-TS), which consisted of 7 subscales, and its potential range was 53.00 to 318.00 (Coleman & Karraker, 2003). The total score of SEPTI-TS was the sum of all SEPTI-TS subscale scores. The mean of participating mothers' total scores of SEPTI-TS was 272.84. A higher SEPTI-TS score meant that a mother perceived a higher degree of parenting self-efficacy. SEPTI-TS scores reported in Coleman and Karraker's study (2003) averaged 267.54 in a sample size of 68 children with the mean age of 21.16 months.

Hypothesis One: Gender and Socioeconomic Differences

The *t*-test was used to examine whether there are child gender and socioeconomic status differences on the scores of maternal self-efficacy and child self-regulation ratings. This study did not find child gender and family socioeconomic status differences. Specifically, the results showed that gender and socioeconomic status were not associated with differences on the scores of mothers' parenting self-efficacy and child dysregulation rating. The only socioeconomic status difference found was in the sensory sensitivity rating scores ($t = -2.72$, $p < .01$). In particular, children living in families with income to needs ratios of less than 2.5 were rated with higher levels of sensory sensitivity problems than those living in families with a ratio above 2.5. The results were shown in Tables 4 and 5 for gender difference and Tables 6 and 7 for socioeconomic status differences.

Hypothesis Two: Maternal Self-Efficacy Associations with Early Self-Regulation

Bivariate correlation analyses were conducted to examine the relationship between child self-regulation and maternal self-efficacy, and relationships between child self-regulation and specific dimensions of maternal self-efficacy.

Table 4.

T-test for Gender Difference on Maternal Self-efficacy

Self-Efficacy	Category	Mean	*t*
SEPTI-Total	Male	271.92	-.34
	Female	273.77	
Emotional Availability	Male	36.92	-.25
	Female	37.17	
Nurturance	Male	41.90	-.40
	Female	42.29	
Protection	Male	36.27	-.70
	Female	36.96	
Discipline / Limit Setting	Male	33.54	-.21
	Female	33.79	
Play	Male	35.02	1.13
	Female	33.44	
Teaching	Male	47.94	-.68
	Female	48.69	
Instrumental Care	Male	40.33	-.88
	Female	41.44	

Note. Sample size: Male = 48, Female = 48

Table 5.

T-test for Gender Difference on Child Self-regulation

Self-Regulation	Category	Mean	*t*
ITSEA - Dysregulation	Male	42.54	-.53
	Female	43.90	
Eating [a.]	Male	49.26	-.72
	Female	50.74	
Negative Emotionality [a.]	Male	49.69	-.31
	Female	50.31	
Sensory Sensitivity [a.]	Male	50.11	.11
	Female	49.89	
Sleep [a.]	Male	50.99	.97
	Female	49.01	

Note. Sample size: Male = 48; Female = 48

[a.] Compared by standardized (T) scores

Table 6.

T-test for Socioeconomic Status Difference on Maternal Self-efficacy

Self-Efficacy	Category	Mean	*t*
SEPTI-Total	Higher SES families [a.]	273.53	.27
	Lower SES families [b.]	271.85	
Emotional Availability	Higher SES families	37.41	1.09
	Lower SES families	36.19	
Nurturance	Higher SES families	42.32	.66
	Lower SES families	41.59	
Protection	Higher SES families	36.60	-.06
	Lower SES families	36.67	
Discipline / Limit Setting	Higher SES families	33.87	.44
	Lower SES families	33.30	
Play	Higher SES families	33.43	-1.96
	Lower SES families	36.44	
Teaching	Higher SES families	48.72	1.02
	Lower SES families	47.48	
Instrumental Care	Higher SES families	41.18	.70
	Lower SES families	40.19	

Note. Sample size: Higher SES families = 68; lower SES families = 27

[a.] Families' income to needs ratio above 2.5 times poverty level

[b.] Families' income to needs ratio less than 2.5 times poverty level

Table 7.

T-test for Socio-economic Status Difference on Child Self-regulation

Self-Regulation	Category	Mean	*t*
ITSEA - Dysregulation	Higher SES families [a.]	42.13	-1.34
	Lower SES families [b.]	45.96	
Eating [c.]	Higher SES families	49.58	-.58
	Lower SES families	50.91	
Negative Emotionality [c.]	Higher SES families	49.80	-.33
	Lower SES families	50.55	
Sensory Sensitivity [c.]	Higher SES families	48.36	-2.72**
	Lower SES families	54.36	
Sleep [c.]	Higher SES families	49.88	-.20
	Lower SES families	50.33	

Note. Sample size: Higher SES families = 68; Lower SES families = 27

[a.] Families' income to needs ratio above 2.5 times poverty level

[b.] Families' income to needs ratio less than 2.5 times poverty level

[c.] Compared by standardized (T) scores

* $p < .05$; ** $p < .01$; *** $p < .001$

The associations were found between child self-regulation and maternal self-efficacy, and measured dimensions of maternal self-efficacy. The results showed that child dysregulation rating was significantly and negatively correlated to the total scores of maternal self-efficacy (r = -.37, p < .001). Thus, Hypothesis 2 was supported by this finding that maternal self-efficacy was positively associated with child self-regulation performance.

In addition, child dysregulation was also found significantly and negatively correlated to specific dimensions of maternal self-efficacy, as measured by SEPTI-TS subscales. The dimensions of maternal self-efficacy significantly correlated to child dysregulation were emotional availability, r = -.22, p < .05; nurturance, r = -.25, p < .05; discipline / limit setting, r = -.26, p < .01; teaching, r = -.24, p < .05; instrumental care, r = -.50, p < .001. However, the dimensions protection (r = -.16) and play (r = -.14) were not significantly correlated to child dysregulation. The correlation results are listed in Table 8.

In summary, these findings only partially supported Hypothesis Two because the protection and play maternal self-efficacy dimensions were not found to be associated with child dysregulation. However, maternal self-efficacy dimensions of emotional availability, nurturance, discipline / limit setting, teaching, and instrumental care were shown to be positively associated with child self-regulation performance.

Hypothesis Three: Selection of Influential Maternal Self-Efficacy Dimensions

A linear hierarchical regression model via the stepwise selection method was conducted to examine which specific dimension of maternal self-efficacy contributed the most variance on the association with toddlers' self-regulation performance at 2 years old.

Table 8.

Correlation Analysis for Maternal Self-efficacy and Self-regulation Measures

	1	2	3	4	5	6	7	8	9
1. ITSEA - Dysregulation	—								
2. SEPTI-Total	-.37***	—							
3. Emotional Availability	-.22*	.73***	—						
4. Nurturance	-.25*	.78***	.78***	—					
5. Protection	-.16	.68***	.61***	.58***	—				
6. Discipline / Limit Setting	-.26**	.73***	.46***	.48***	.38***	—			
7. Play	-.14	.63***	.33**	.35**	.20*	.36***	—		
8. Teaching	-.24*	.73***	.29**	.39***	.46***	.51***	.40***	—	
9. Instrumental Care	-.50***	.63***	.26*	.37***	.25*	.36***	.26*	.49***	—

Note. Sample size = 96
* $p < .05$; ** $p < .01$; *** $p < .001$

The stepwise regression results showed that only the dimension of instrumental care (β = -.50, ΔR^2 = .25, p < .001) was selected into the regression model and presented in the analysis result output. All the other maternal self-efficacy dimensions were excluded from the stepwise regression model. This result indicated that the instrumental care dimension of maternal self-efficacy contributed more variance than the other dimension measured in this study, such as emotional availability, nurturance, protection, discipline / limit setting, play, and teaching, on the association with child dysregulation outcome. The result of this regression analysis is shown in Table 9.

Additionally, this study also examined the multicollinearity issue. The statistic of *tolerance* was used to interpret multicollinearity in this study. In this stepwise regression model, the tolerance value of each predictor was found to be greater than .30. Therefore,

Table 9.

Stepwise Regression Analysis for the Effect of Maternal Self-efficacy on Later Self-regulation

	Later self-regulation				
Model	Variable	β_1	β_2	ΔR^2	*Part r*
1	Demography			.03	
	Gender	.08	.12		
	Socio-economic Status	.15	.12		
2	Self-Efficacy				
	Instrumental Care		-.50***	.25***	-.50

Note. Sample size = 95
β_1 and β_2: coefficients of model 1 and model 2
* p < .05; ** p < .01; *** p < .001

these tolerance values indicated that multicollinearity did not exist in the regression model of this study.

In conclusion, this finding supported Hypothesis Three that higher maternal self-efficacy in the dimension of instrumental care contributed more variance than the other measured dimensions of maternal self-efficacy on the association with toddlers' better self-regulation.

Hypothesis Four: Early Self-Regulation Associations with Maternal Self-Efficacy

Bivariate correlation analyses were adopted to examine relationships between maternal self-efficacy and each aspect of child self-regulation. This study found associations between maternal self-efficacy and measured aspects of child dysregulation. The results showed that maternal self-efficacy was significantly and negatively correlated to the measured aspects of child dysregulation. The aspects of child dysregulation that were significantly correlated to maternal self-efficacy were eating, $r = -.31$, $p < .01$; negative emotionality, $r = -.43$, $p < .001$; sensory sensitivity, $r = -.37$, $p < .001$. However, the aspect: sleep ($r = -.04$) was not found to be significantly correlated to maternal self-efficacy. The correlation results are listed in Table 10.

In summary, the findings only partially supported Hypothesis Four because the sleep aspect of child dysregulation was not associated with rated maternal self-efficacy. However, the other measured aspects of child dysregulation of eating, negative emotionality, and sensory sensitivity were found to be negatively associated with rated maternal self-efficacy.

Table 10.

Correlation Analysis for Dysregulation and Maternal Self-efficacy Measures

	1.	2.	3.	4.	5.	6.
1. SEPTI-Total	—					
2. ITSEA - Dysregulation	-.37***	—				
3. Eating	-.31**	.77***	—			
4. Negative Emotionality	-.43***	.60***	.36***	—		
5. Sensory Sensitivity	-.37***	.56***	.37***	.27**	—	
6. Sleep	-.04	.67***	.32**	.20*	.05	—

Note. Sample size = 96
* $p < .05$; ** $p < .01$; *** $p < .001$

Hypothesis Five: Selection of Influential Child Dysregulation Aspects

A linear hierarchical regression model via the stepwise selection method was utilized to examine the specific aspect of child dysregulation that contributed the most variance on the association with maternal self-efficacy.

The stepwise regression result showed that two aspects—negative emotionality (β = -.36, ΔR^2 = .19, $p < .001$) and sensory sensitivity (β = -.30, ΔR^2 = .08, $p < .01$)—were selected into the regression model and presented in the analysis result output. Other child dysregulation aspects were excluded from the model. The result indicated that the negative emotionality and sensory sensitivity aspects of child dysregulation contributed more variance than the eating and sleep aspects did on the association with maternal self-efficacy. The result of this regression analysis is shown in Table 11.

Table 11.

Stepwise Regression Analysis for the Effect of Dysregulation on Maternal Self-efficacy

	Maternal self-efficacy				
Model	Variable	β_1	β_2	ΔR^2	*Part r*
1	Demography			.002	
	Gender	.04	.07		
	Socio-economic Status	-.02	.08		
2	Dysregulation				
	Negative Emotionality		-.36***	.19***	-.43
	Sensory Sensitivity		-.30**	.08**	-.37

Note. Sample size = 95
β_1 and β_2: coefficients of model 1 and model 2
* $p < .05$; ** $p < .01$; *** $p < .001$

Additionally, the multicollinearity issue was examined in this analysis. In this stepwise regression model, the tolerance value of each predictor was found to be greater than .70. Therefore, these tolerance values indicated that multicollinearity did not exist in this regression analysis.

In conclusion, this finding supported Hypothesis Five that higher levels of negative emotionality, one aspect of child dysregulation, contributed more variance than the other measured aspect of child dysregulation at 2 years on the association with lower maternal self-efficacy because negative emotionality aspect had a greater *R* square change value than the other aspects in the regression analysis.

CHAPTER 5: DISCUSSION

The present study examined the relationship between maternal self-efficacy and toddlers' self-regulation. Child gender and family socioeconomic status were hypothesized to impact this relationship and were also examined. In particular, this study investigated whether specific dimensions of maternal self-efficacy were associated with toddlers' self-regulation performance and measured elements of toddlers' dysregulation.

Hypothesis One: Gender and Socioeconomic Differences

Child gender and family socio-economic status were not related to differences on mothers' parental self-efficacy and child dysregulation in the current study. Past research has noted mixed results in this area. Carter et al. (2003) conducted a study to examine the psychometric properties of the ITSEA in a diverse toddler sample. In their study, the scores on the dysregulation subscale of ITSEA did not vary by gender. Additionally, Briggs-Gowan and Carter (1998) also conducted a study to examine the preliminary acceptability and psychometric properties of ITSEA during toddlerhood. Their study found that boys' dysregulation scores of ITSEA did not differ from those of girls. However, Raffaelli et al. (2005) did find a gender difference in child self-regulation development. Their study recruited cohorts of children ranging in age from 4 to 12 years. The results showed that girls exhibited higher level of self-regulation performance than boys.

These differences may be the result of measurement issues. Raffaelli et al. (2005) found gender differences in child self-regulation development, but that study did not use the ITSEA to measure self-regulation; the present study, however, does use the ITSEA to assess child self-regulation. Briggs-Gowan and Carter (1998) argued that little empirical

information was available to clarify gender difference on self-regulation of children younger than 3 years old; therefore the current study's focus on toddlers so child age may be particularly salient when examining the relationship between gender and self-regulation.

Moreover, according to child self-regulation developmental phases which Kopp (1982, 1990) indicated, child self-control capacity begins to develop around 12 to 18 months. Thus, toddlerhood, based on Kopp's viewpoint, was a period when toddlers experienced growth of self-control ability. Therefore, the gender difference of self-regulation developmental outcome may not reach a significant level during toddlerhood. In other words, gender difference on self-regulation may show out after toddlerhood when toddlers' regulatory capacity becomes more mature.

In addition, previous research findings have varied on gender difference on maternal self-efficacy. Jackson (2000) examined whether maternal self-efficacy and children's behavior problems predicted parenting stress. All participants were African American single mothers with children aged 3 to 4 years old. Jackson (2000) found that there was no gender difference on the scores of maternal self-efficacy, or in the association between maternal self-efficacy and mothers' parenting stress. On the other hand, Maniadaki et al. (2005) examined differences in mothers' emotional response and self-efficacy beliefs for mothers' with children aged 4 to 6 years old. They found there was a significant gender difference in maternal self-efficacy. However, the participating children were diagnosed with AD/HD so these distinctions may be due in part to child characteristics. Moreover, it should be addressed that the age of recruited sample in the above studies was older than

toddler age, so the above research findings may not be generalized to toddler developmental outcomes.

In Coleman and Karraker's (1997) synthesized research findings, child gender was not found to have a strong association with maternal self-efficacy. In addition, several empirical studies have found other factors, such as mothers' obtained knowledge about parenthood and child development during pregnancy or postpartum, and social supports from their partners and families, were more important than child gender in influencing the development of maternal self-efficacy (Conrad et al., 1992; Cutrona & Troutman, 1986; Deutsche et al., 1988; Goodnow, 1985; Grusec et al., 1994; Leerkes & Crockenberg, 2002).

This study did not found socio-economic status differences in maternal self-efficacy and 2-year child self-regulation. However, several previous studies have found a relationship between socio-economic status and differences in either maternal self-efficacy or child self-regulation.

Barbarin and Richter (2001) conducted a study to examine the relationship among community violence, family economic status, and child behavioral and emotional problems assessed at 6 years old. They found that children living in high economic status, which is higher rated scores of consumption and financial capital, were rated with higher self-regulation than those living in low or moderate economic status. In addition, Miech et al. (2001) conducted a study to examine the relationship among child self-regulation, socio-economic status, and child school adjustment outcomes at child age of 4.5 years old. The results showed that children living in higher income families were rated with better self-regulation performance than those living in lower income families.

As for socio-economic status difference in maternal self-efficacy, Elder et al. study (1995) examined the links among family income, maternal economic pressure, and maternal self-efficacy with children aged 11 to 15 years. Their results showed that, in general, lower family income or unstable work patterns were negatively associated with maternal self-efficacy. In addition, Brody et al. (1999) examined the correlation among a family's financial strain, maternal self-efficacy, parenting, and child self-regulation with children aged 6 to 9 years old. Their study found that mothers with plentiful financial resources perceived higher maternal self-efficacy and had children with better self-regulation performance than those with impoverished financial resources.

However, it was important to note that the recruited sample of the current study and previous studies may lead to these inconsistent findings about socio-economic status differences in either maternal self-efficacy or child self-regulation. First, the cited previous research in this study targeted children older than toddler age, while this study examined the socio-economic differences in toddlerhood. Thus, the age of recruited sample should be considered in the context of these inconsistent findings. Second, the sample recruited in this study was primarily middle to upper class. According to the family socio-economic status data of this study, the average of their earned annual income before taxes was $77,353.48, and 70.8% of participant families were classified as higher socio-economic status with an income to needs ratio higher than 2.5 (see table 1 and 3). Thus, the absence of lower income families in this study may impact the results of socioeconomic status effects on maternal self-efficacy and child self-regulation.

Hypothesis Two: Maternal Self-Efficacy Associations with Early Self-Regulation

The main purpose of this study was to determine the relationship between maternal self-efficacy and child self-regulation at 2 years of age. The results showed that maternal self-efficacy was negatively associated with child dysregulation rating. In other words, higher maternal self-efficacy was associated with better self-regulation performance, thus supporting the original hypothesis.

Several studies (Brody et al., 1999; Coleman & Karraker, 2003; Jackson & Scheines, 2005; Kochanska, 1990) have indicated the association between mothers' parenting self-efficacy and children's self-regulation. The influence of maternal self-efficacy on children's self-regulation may be through mother's parenting. Some studies found that maternal self-efficacy influenced parenting efficiency, which further influenced children's self-regulation performance (Brody et al., 1999; Jackson & Scheines, 2005).

Maternal use of effective parenting practices was related to their maternal self-efficacy. Teti and Gelfand's study (1991) concluded that maternal self-efficacy was positively associated with more use of positive mothering, such as warm mothering and higher maternal sensitivity. In addition, the work of Donovan et al. (1990) indicated that mothers with lower self-efficacy would be less likely to respond to their children's emotional reactivity.

In addition, mothers' parenting was found to be an important factor influencing child self-regulation development. Diener and Mangelsdorf (1999) found that toddlers display more emotion regulation strategies (e.g., social referencing and playing with stimulus objects) when mothers were involved in toddler's behavior than when mothers were relatively less involved or not available. Some studies (Diener & Mangelsdorf, 1999;

Grolnick et al., 1996; Kopp, 1989) have also indicated the importance of mothering on toddlers' display of more active strategies to regulate their emotions or improve their regulatory skills. Toddlers' self-regulation skills did not emerge immediately, so they need external agents or assistance to help them respond to requests and social demands during toddlerhood (Putnam et al, 2002).

In conclusion, mothers' parenting played an important role on the developmental trajectory of toddlers' self-regulation. Moreover, competent parenting was related to mother's belief of parenting self-efficacy. Thus, the above studies supported the association between maternal self-efficacy and children's self-regulation found in this study.

Moreover, this study further examined which specific dimensions of maternal self-efficacy were associated with child self-regulation performance. The dimensions of maternal self-efficacy examined in this study included emotional availability, nurturance, protection, discipline / limit setting, play, teaching, and instrumental care. These dimensions were subscales of the maternal self-efficacy measure used in this study.

The present study investigated the dimensions of emotional availability (e.g., "I believe that I adequately meet my child's needs to feel secure and accepted."), nurturance (e.g., "I am able to sense when my child is starting to become distressed."), discipline / limit setting (e.g., "Setting limits for my toddler is relatively easy for me."), teaching (e.g., "I believe my toddler learns a great deal from my efforts to show him/her things."), and instrumental care (e.g., "I have worked out a fairly regular morning routine with my toddler."). The results showed that not all maternal self-efficacy dimensions were consistent with the hypothesis. In particular, the protection and play dimensions were not

associated with child dysregulation. However, the other dimensions were negatively associated with child dysregulation problems.

As Bandura (1982, 1989) argued, people with high self-efficacy had the characteristics of setting clear achievement goals and insisting on these goals until achieved. Moreover, Coleman and Karraker (1997) summarized four avenues of maternal self-efficacy influence on parenting competency. One of these avenues was motivational process. Specifically, higher maternal self-efficacy led to higher parenting competency through the aspired motivation. Furthermore, one result of the maternal self-efficacy influence on motivation was performed in task-specific goal setting (Schunk, 1990, cited in Coleman & Karraker, 1997). If a mother was rated with low self-efficacy, she may dare to formulate specific parenting goals due to lower levels of motivation, even these parenting goals are easily to be set (Coleman & Karraker, 1997; see also Bouffard-Bouchard, 1990). However, if a mother rated herself as highly self-efficacious, she will have higher motivation or aspiration to set clear and specific, even higher standard parenting goals (Coleman & Karraker, 1997; see also Bouffard-Bouchard, 1990). These goals would become the framework of performing her parental role, and they would persist in these goals when interacting with children until these goals are accomplished (Coleman & Karraker, 1997, 2003; Coleman, 1998). Although little empirical research investigated the relationship between specific dimensions of maternal self-efficacy and child developmental outcome or parenting competence, it could be speculated that if a mother is rated high on a specific dimension of maternal self-efficacy, she might set particular parenting goals related to that maternal self-efficacy dimension. Furthermore, these parenting goals might influence parenting competence, which, in turn, would likely

influence child self-regulation development (Bandura, 1982, 1989; Coleman & Karraker, 1997, 2003). This study did not include any measure of parental expectations or goals, and this nuance was one that should be included in future research.

In this study, the emotional availability and nurturance dimensions of maternal self-efficacy were found to be positively associated with child self-regulation. Thus, if mothers were rated higher on these maternal self-efficacy dimensions, their parenting goals may be to create an atmosphere or to interact with children in the way full of emotional supports, comforting available, or understanding and sensitive to children's emotion responses. Little and Carter's study (2005) indicated that children of parents with successful emotional competence preferred to perform warm, communicative, and reactive behaviors (Little & Carter, 2005). Moreover, Garner (1995) found that a positive emotional atmosphere was associated with children's increased self-soothing behavior. Garner (1995) argued that positive emotional experiences at home, such as sharing caregivers' positive emotions with children, would benefit children's future regulation skill development. Therefore, if mothers perceived high emotional availability or nurturance dimensions of maternal self-efficacy, it may be speculated that their parenting goals would help their children to develop effective emotion regulatory strategies.

Teaching and instrumental care dimensions of maternal self-efficacy were found to be positively associated with child self-regulation in this study. If mothers were rated higher on these two dimensions, the parenting goals they set might assist child learning activities, establish and monitor daily routines, and display more instructions than emotional responses to child emotional reactivity. In addition, the discipline / limit setting dimension was seen to be positively associated with child self-regulation. If mothers

rated themselves higher on this dimension, their parenting goals may be to set clear limits on children's behavior. Lecuyer and Houck (2006) argued that maternal sensitive responses or clear commands could facilitate children's self-regulation development because these strategies directed child behavior in an acceptable way. In addition, if mothers performed parenting patterns, such as clear limits or negotiation rather than powerful control, these parenting patterns might provide more opportunities for toddlers to understand and internalize standards and rules (Lecuyer & Houck, 2006). Moreover, Houck and LeCuyer-Maus (2004) indicated that clear limits, instead of restrictive control, made children aware of social standard and rules, which further improved child self-regulation capacity. Thus, if mothers were rated high on the teaching, instrumental care, and/or discipline / limit setting dimensions of maternal self-efficacy, the parenting goals they set may help them perform parenting practices to effectively regulate toddlers' emotional reactivity, which could result in toddlers' better self-regulation performance.

This study did not find any association between maternal self-efficacy in the dimensions: protection and play and toddler self-regulation. Little empirical evidence indicated any association between these two dimensions and toddlers' self-regulation development. However, some research provided related viewpoints which may help understand these findings. Grolnick et al. (1998) found that maternal over-active engagement did not decrease children's distress, but did increase their distress level. The study concluded that mothers' over-actively initiated engagement, such as active protection and restriction, made children lose opportunities to develop their emotional regulatory strategies independently. Moreover, some research (e.g., Putnam et al., 2002; Vaughn, Kopp, & Krakow, 1984) has speculated that when mothers actively engaged in

child play, within an atmosphere of play, toddlers treated mothers as their play partners with the same standing. In that situation, toddlers may not pay attention to what mothers wanted to teach them during playing, and thus they lost opportunities to learn how to appropriately express their emotions. However, it may be speculated that the parenting goals related to the play dimension may not impact child regulation to the degree of the other dimensions under study. Moreover, it should be addressed that this study did not include information about maternal expectations or parenting goals. Thus, the above speculations may need further empirical examinations to confirm whether play or protection dimension of maternal self-efficacy was associated with toddler self-regulation.

Hypothesis Three: Selection of Influential Maternal Self-Efficacy Dimensions

This study further investigated which dimension of maternal self-efficacy contributed the most variance in association with child self-regulation. The results suggested that instrumental care explained more variance than the other dimensions (e.g., emotional availability, nurturance, protection, discipline / limit setting, play, and teaching) of maternal self-efficacy.

It can be speculated that mothers with higher levels of maternal self-efficacy may set different parenting goals related to different maternal self-efficacy dimensions. Thus, if mothers rated themselves higher in instrumental care, they may set parenting goals regarding child instruction on appropriate social performance or devote most of their time to establishing children's daily routines and monitoring children's daily behavior following these routines. Little empirical research has investigated the relationships of different maternal self-efficacy dimensions with child self-regulation or has examined which specific dimension has a stronger relationship with child self-regulation than the

others. However, some previous investigations of child self-regulation development may provide insight to understand the above questions.

Toddlers' self-regulation skills are developmental in nature, instead of emerging immediately. These regulatory skills gradually developed and become mature as age increased. Thus, before these skills were developed mature, toddlers needed external agents to help them meet external demands (Putnam et al., 2002). It has been argued that mothers' limit setting is central to toddlers' development of autonomy and toddlers learning of social standards, rules, and demands from the social context (Houck & LeCuyer-Maus, 2004). Through their mothers' direction, training, and limit setting, toddlers could model and learn how to regulate their emotional arousals (Mauro & Harris, 2000; Reitman & Gross, 1997; Silverman & Ippolito, 1995).

Based on the above research argument, it could be speculated that the instrumental care dimension of maternal self-efficacy may have a stronger relationship with child self-regulation development than the other dimensions. Potentially, the parenting goals of mothers rated high in the instrumental care dimension may cause them to guide their children regarding what they should and should not do during daily activities, which then allowed their toddlers to internalize social norms and provides opportunities to learn how to regulate their emotional arousals in order to cope with external demands. Therefore, among the dimensions of maternal self-efficacy examined, it could be anticipated that the parenting goals of mothers rated high in the instrumental care dimension of maternal self-efficacy may be more helpful in developing toddlers' effective emotional regulatory strategies than parenting goals related to the other maternal self-efficacy dimensions measured.

However, it should be addressed that the above study findings and speculations were based on maternal self-efficacy data assessed via SEPTI-TS. Future research should compare different maternal self-efficacy measures to examine whether the instrumental care dimension of maternal self-efficacy has a stronger relationship with toddler self-regulation performance than the other dimensions of maternal self-efficacy.

Hypothesis Four: Early Self-Regulation Associations with Maternal Self-Efficacy

This study examined the relationship between aspects of toddlers' dysregulation measured in this study and maternal self-efficacy. The results showed that the aspects of child dysregulation: negative emotionality, sensory sensitivity, and eating were negatively associated with rated maternal self-efficacy. These findings were consistent with the hypothesis that lower levels of child self-regulation at 2 years old were associated with lower perceived maternal self-efficacy.

Previous studies (Cutrona & Troutman, 1986; Leerkes & Crockenberg, 2002; Teti & Gelfand, 1991) have indicated the associations of child early self-regulation with maternal self-efficacy. More specifically, young children's temperamental difficulty has been negatively associated with maternal self-efficacy. Mothers might perceive that it was a more difficult and challenging task if they reared a temperamentally difficult child (Bandura, 1977; Coleman & Karraker, 1997). Grolnick et al. (1998) argued that parents actively used every method they could to soothe their children when children expressed distress. However, if children were considered temperamentally difficult, it would be challenging for mothers to soothe these children, even though the mothers have used every strategy they knew, compared to soothing temperamentally easy children (Coleman & Karraker, 1997). This child rearing experience may make mothers feel that they were

helpless and that it was useless to use another method to regulate children's emotional reactivity. Donovan et al. (1990) supported this perspective in their study. They found that in lab tasks of illusory control, mothers learned helplessness and were rated to perceive lower parenting self-efficacy if their children were difficult to soothe, compared to those mothers with easily soothed children.

Based on the above viewpoints and findings, children's temperament or early self-regulation performance was an important factor in mothers' perceived parenting self-efficacy. In other words, mothers felt that they could not effectively perform parenting practices to regulate children's arousals, but this challenge may be the result of temperamental style or child self-regulation challenges.

Young children's negative emotionality has been observed to be related to maternal self-efficacy. Coleman and Karraker's study (2003) investigated this relationship through a psychometric property examination of maternal self-efficacy scale. They found that higher maternal self-efficacy was negatively associated with child negativity. In addition, several studies (Burnham, et al., 2002; Degangi, et al., 2000; Gregory & O'Conner, 2002; Hagekull & Bohlin, 2004) have indicated that children's sensory sensitivity, and eating and sleeping problems were associated with future problems in development and emotional regulation. However, fewer empirical studies have examined whether young children's sensory sensitivity, eating, or sleeping problems were associated with maternal self-efficacy.

The methodology of data collection may lead to the lack of association between sleeping problems and maternal self-efficacy. The dominant method for assessing sleeping problems found in previous studies (e.g., Burnham et al., 2002; Gregory &

O'Conner, 2002) was collected in the lab context. In the lab, children's abnormal sleeping pattern may be collected precisely, and the assessed data might be closer to child actual dysregulation reactivity. Thus, future research should explore the possible associations between early dysregulation problems and maternal self-efficacy.

Hypothesis Five: Selection of Influential Child Dysregulation Aspects

This study also examined which aspect of toddlers' self-regulation was most associated with maternal self-efficacy. A stepwise regression analysis was used to determine which measured aspect of toddlers' dysregulation contributed the most variance on the association with maternal self-efficacy. The results indicated that two aspects of child dysregulation—negative emotionality and sensory sensitivity—were selected into the regression model. In addition, negative emotionality had the largest explained variance on the association with maternal self-efficacy. This finding supported the hypothesis that higher levels of negative emotionality contributed more variance than any other measured aspects of child dysregulation at 2 years old on the association with lower maternal self-efficacy.

Several studies (Cutrona & Troutman, 1986; Leerkes & Crockenberg, 2002; Teti & Gelfand, 1991) have examined the association between child early dysregulation problems (or difficult temperament) and maternal self-efficacy. It has been argued that mothers' perceived maternal self-efficacy was related to whether their young children's temperament was easy or difficult (Teti & Gelfand, 1991). In other words, mothers perceived a higher degree of maternal self-efficacy if they perceived their children's behavior to be predictable and manageable (Cutrona & Troutman, 1986; Goldberg, 1977; Teti & Gelfand, 1991). On the contrary, mothers perceived a lower degree of maternal

self-efficacy if they perceived their children's behavior to be difficult to interpret and/or hard to soothe (Cutrona & Troutman, 1986; Goldberg, 1977; Teti & Gelfand, 1991).

Fewer empirical studies have examined the associations among child early dysregulation problems and maternal self-efficacy. However, it could be speculated that, among the dysregulation problems measured in this study, children's negative emotionality may be more difficult for mothers to predict and interpret than child eating and sleeping problems. Children rated high in negative emotionality may display unpredictable bad moods, and this emotional reactivity was not easily soothed. Similarly, children's sensory sensitivity problems may be more challenging for mothers to manage than child eating and sleeping problems. Thus, children's negative emotionality or sensory sensitivity problems may have stronger associations with maternal self-efficacy than problems of eating and sleeping.

However, it should be emphasized that little empirical evidence was found relative to the comparison between maternal self-efficacy and negative emotionality together with eating and sleeping problems. Thus, this study may be treated as exploratory research to compare the associations of negative emotionality, sensory sensitivity, eating, and sleeping problems with mother's parenting self-efficacy. In other words, this study provides an outline for subsequent studies to discover which aspect of child dysregulation may have the strongest association with maternal self-efficacy. Future research will be required for more empirical data to compare the associations between those aspects of child dysregulation and maternal self-efficacy.

Limitations and Applications

There were some limitations in the present study. First, the sample of this study only targeted children born in one local area. Moreover, the majority of research participants were European Americans living in middle to high socio-economic status. Thus, this homogeneous sample limited the generalization of study findings to the broader population. The second limitation was related to the type of data collected in this study. Most data was collected through mothers' self-reporting. However, some studies have indicated that mothers' mental health might influence their reporting of children's behavior problems (Hatfield, 2007). For example, mothers' emotional stability has been known to influence maternal report of children's temperament (Matheny, Wilson, & Thoben, 1987). Thus, mothers' mental health may bias the reported child dysregulation data. Moreover, self-reported maternal self-efficacy data may be influenced by mothers' perceptions of child dysregulation problems. Some research (Colman & Karraker, 1997; Teti & Gelfand, 1991) has documented that mothers' perceived child difficult temperament influenced the degree of maternal self-efficacy. Because the child dysregulation data in this study adopted mothers' self-reported data, lower levels of reported self-efficacy might result from higher child dysregulation, which might further bias the interpretation of analysis results of associations between maternal self-efficacy and child self-regulation. Thus, if data could be assessed through observation in the natural context, it may more precisely reflect mothers' and children's actual behavior than self-reported data (Hatfield, 2007).

Bandura (1989) argued that the amount of a person's acquired knowledge influences the degree of his/her perceived self-efficacy. According to the developmental resources

of maternal self-efficacy listed by Coleman and Karraker (1997), mothers' child development and caregiving knowledge influenced the degree of perceived parenting self-efficacy. However, the current study did not include mothers' child development and caregiving knowledge. Thus, without the consideration of mothers' knowledge in this area the associations between maternal self-efficacy and child self-regulation may be limited and biased.

However, the present study contributes some exploratory findings in two primary areas. First, this study targeted toddlerhood to investigate associations between maternal self-efficacy assessed in toddlerhood and toddlers' self-regulation. Some previous studies (e.g., Brody et al., 1999; Jackson & Scheines, 2005) have examined the association between maternal self-efficacy and child self-regulation outcomes. However, these studies targeted on children older than toddler age, In addition, little empirical research was found to examine this association in toddlerhood.

It has been argued that young children's cognitive, linguistic, or socio-emotional development experience dramatic improvement and change during toddlerhood (Coleman & Karraker, 2003; Kopp, 1982, 1989). Coleman and Karraker (2003) argued that due to this dramatic change on toddler developmental outcomes, mothers have to learn many new parenting skills in order to effective deal with toddlers' emotional responses. As Bandura (1982) suggested, whether an individual is motivated to acquire new knowledge or skills is related to his belief of self-efficacy. Thus, it is worthwhile further investigating toddlers' developmental conditions and the associations of these developmental conditions with maternal self-efficacy.

Second, this study explored which dimension of maternal self-efficacy had the strongest relationship with child self-regulation; the same investigation was conducted for child dysregulation aspects. Previous studies (e.g., Brody et al., 1999; Coleman & Karraker, 2003; Cutrona & Troutman, 1986; Teti & Gelfand, 1991) only examined the associations between the composite scores of maternal self-efficacy and child developmental outcomes. Thus, it remained unclear in which area (or domain) that maternal self-efficacy had the strongest relationship with the development of child self-regulation. Through separate examinations of associations between specific maternal self-efficacy dimensions and child self-regulation, mothers can obtain concepts that which areas they should especially pay attention to during daily practices of parenting.

This study found that the instrumental care dimension of maternal self-efficacy had the strongest association with child self-regulation performance, which may have implications for family educators and others who support mothers of young children, especially toddlers. Specifically, developing an awareness of mothers' perspectives on daily routines and strengthening maternal self-efficacy in this arena may prove beneficial. Several studies (Bandura, 1989; Coleman & Karraker, 1997; Conrad et al., 1992; Deutsche et al., 1988) have indicated that the amount of mothers' acquired knowledge about parenthood and child rearing was positively associated with the degree of perceived maternal self-efficacy. Thus, increasing mothers' parental knowledge, particularly related to daily routines, may enhance mothers' parenting ability. This is because effective, established daily routines may provide an opportunity for mothers to practice parenting in the way of fulfilling child developmental needs, including early self-regulation development. In addition, these daily routines may assist mothers to effectively monitor

child behavior to fulfill social standard, and this successful monitoring may further enhance maternal self-efficacy.

In conclusion, this study provides a crucial viewpoint for mothers and family educators that maternal self-efficacy, especially the dimension of instrumental care, is an important factor associated with effective parenting performance, which further enhances the development of toddlers' self-regulatory capacity.

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APPENDICES

Appendix A

The Self-Efficacy for Parenting Task Index-Toddler Scale (SEPTI-TS)

Emotional Availability

1. Even when I have had an unusually distressing day, I think my child knows I am available to meet his or her emotional needs.

2. I believe that I adequately meet my child's needs to feel secure and accepted.

3. When my child needs me, I am able to easily put aside whatever else I may be doing.

4. I find it difficult to always be available to provide my child with the comfort he/she needs in dealing with the many frustrations and fears that toddlers face each day.*

5. Providing physical comfort for my child is easy for me.

6. I am usually willing to stop what I'm doing and cuddle my child when he/she seems to need affection.

7. I am often too preoccupied with my own problems to keep up with my child's changing emotions.*

Nurturance/Valuing/ Empathetic Responsiveness

8. I am able to sense when my child is starting to become distressed.

9. My toddler knows that I understand when his/her feelings are hurt.

10. I think my child knows by my behavior how much I really adore him/her.

11. My child feels very loved by me.

12. I think I am tolerant and understanding when my child displays negative emotions.

13. I find it very distressing when my child isn't in a good mood.*

14. I definitely fulfill my parental duties when it comes to providing emotional support for my child.

15. When my child has a problem, he/she knows I will want to help.

Protection

16. Providing a safe, hazard-free environment for my child is very difficult for me.*

17. I feel comfortable with my ability to react well should an emergency arise in which my child's physical well-being is in danger.

18. When I leave my child in someone else's care, I make sure that the substitute care provider will be capable of protecting my child from harm.

19. I have my home arranged to prevent as many accidents as possible with my toddler.

20. I am very good about never leaving my child unattended.

21. I always make sure I can see my child in order to make sure he/she does not get hurt.

22. I have difficulty determining what is and is not safe for my child to do.*

Discipline/Limit Setting

23. Disciplining my child does not seem to be coming as naturally to me as other parts of parenting.*

24. I have trouble getting my child to listen to me.*

25. Other parents seem to have more success with setting limits for their children than I do with my child.*

26. Setting limits for my toddler is relatively easy for me.

27. When my toddler tests the limits that I have set up, I find myself becoming extremely discouraged.*

28. Telling my child "no" when safety isn't the issue is hard for me.*

29. I allow my child enough freedom to actively explore the environment.

Play

30. I can always think of something to play with my child.

31. I am a fun playmate for my toddler.

32. I find it hard to loosen up and just play with my child.*

33. I am able to get actively involved in playing with my child.

34. Playing is a part of my relationship with my child that I have very little difficulty with.

35. I really need to learn how to just have fun with my child.*

36. I think I spend an appropriate amount of time just playing with my child.

Teaching

37. I believe my toddler learns a great deal from my efforts to show him/her things.

38. Assisting my child with learning to talk and understand words is a part of parenting that I leave to others.*

39. Sitting down regularly with my child to read or do some other one-on-one activity is not difficult for me.

40. I am probably not that great at teaching my child about the world.*

41. I have some difficulty figuring out the appropriate level of instruction when I'm trying to explain something to my child.*

42. Helping my child learn colors, names of objects, etc. is not one of my strongest points.*

43. My child learns more from me than anyone else in his/her life.

44. I easily find opportunities to point out things about the world during my daily interactions with my child.

45. Although I would like to help my child learn more about his/her surroundings, this is

an area of parenting that I do not feel well-equipped for.*

Instrumental Care/ Structure/ Routines

46. I have been able to establish a daily routine with my toddler that feels comfortable to both of us.

47. I am able to provide my child with a comfortable amount of daily structure.

48. I have been successful in getting my child to eat on a fairly regular schedule.

49. I feel like I have no control over my child's sleep habits.*

50. I am not very good at getting my child to stick to a regular daily schedule.*

51. Although I have tried to train my child to eat well, my efforts have been met with very little success.*

52. I don't seem to be able to establish a regular bed time routine with my child.*

53. I have worked out a fairly regular morning routine with my toddler.

Note. *Indicates item is reverse scored.

Appendix B

The Infant-Toddler Social and Emotional Assessment (ITSEA)

3. Dysregulation Domain (34 items)

Sleep (5 items)

Must be held to go to sleep.

Wakes up at night and needs help to fall asleep again.

Has trouble falling asleep or staying asleep.

Negative emotionality (13 items)

Wakes up grouchy or in a bad mood.

Gets angry or pouts.

Is impatient or easily frustrated.

Has trouble adjusting to changes.

Is hard to soothe when upset.

Cries or tantrums until s/he is exhausted.

Eating (9 items)

Accepts new foods right away (Reversed).

Is a picky eater.

Refuses to eat certain food(s) for 2 days or more.

Spits out food(s).

Refuses to eat foods that require chewing.

Sensory sensitivity (7 items)

Is bothered by loud noises or bright lights.

Is bothered by being in motion (e.g., swinging, etc.).

Is bothered by how some things feel on his/her skin.

Is bothered by certain odors (smells).

VITA

Yu-Chuen Huang received his Bachelor of Sciences degree in 2003 from National Cheng Kung University in Tainan City, Taiwan. His bachelor major is material science and engineering. Yu-Chuen received his Master of Science degree in 2008 from University of Tennessee, Knoxville with a major in Child and Family Studies. His research interest during mater study is statistical methodology and psychometric analysis applied to early childhood education and parenting research areas. Yu-Chuen will pursue his second M.S. in Department of Statistics at the University of Missouri, Columbia beginning in the fall of 2008 focusing on sampling and psychometric analysis applied to social science research areas.